DRAFT INTERNATIONAL STANDARD ISO/DIS 10722-1

ISO/TC **221** Secretariat: **BSI**

Voting begins on: **2004-06-24** Voting terminates on: **2004-11-24**

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Geotextiles and geotextile-related products — Procedure for simulating damage during installation —

Part 1:
Installation in granular materials

Géotextiles et produits apparentés — Mode opératoire de simulation de l'endommagement pendant l'installation —

Partie 1: Installation dans des matériaux granulaires

(Revision of ISO/TR 10722-1:1998)

ICS 59.080.70

ISO/CEN PARALLEL ENQUIRY

This draft International Standard is a draft standard developed within the European Committee for Standardization (CEN) and processed under the CEN-lead mode of collaboration as defined in the Vienna Agreement. The document has been transmitted by CEN to ISO for circulation for ISO member body voting in parallel with CEN enquiry. Comments received from ISO member bodies, including those from non-CEN members, will be considered by the appropriate CEN technical body. Should this DIS be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month FDIS vote in ISO and formal vote in CEN.

In accordance with the provisions of Council Resolution 15/1993 this document is circulated in the English language only.

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To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

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1 Scope

This International Standard describes a laboratory procedure for simulating mechanical damage to geosynthetics, caused by granular material. The damage is assessed visually and by the loss of tensile strength.

Other reference tests may be used to assess the damage caused by this test. The test method described is an index test procedure.

2 Normative References

This 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 publications apply to this standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies.

ISO 554 Standard atmospheres for conditioning and/or testing - Specifications.

EN ISO 10319 Geotextiles – Wide-width tensile test

EN ISO 11058 Geotextile and geotextile-related products - Determination of water permeability

	normal to the plane without load
EN ISO 12236	Geotextile and geotextile-related products - Static puncture test (CBR test).
EN ISO 12956	Geotextile and geotextile-related products - Determination of the characteristic opening size
EN 918	Geotextile and geotextile-related products - Dynamic perforation test (Cone drop test) (ISO/CD 13433:2004).
EN 933-1	Tests for the geometrical properties of aggregates –Part 1: Determination of the particle size distribution - Sieving method
EN 963	Geotextiles and geotextile-related products - Sampling and preparation of test specimens (ISO/FDIS 9863:2003).
EN 1097-2	Tests for mechanical and physical properties of aggregates - Methods for determination of resistance to fragmentation - Part 2: Methods for the determination of resistance to fragmentation

3 Definitions

For the purpose of this European Standard the following definition applies:

3.1
Reference test
The test used to determine a particular property of the geosynthetic being damaged in this procedure.

4 Principle

A geosynthetic specimen is placed between two layers of a synthetic aggregate and subjected to a period of dynamic loading. The geosynthetic specimen is then removed from the test apparatus, examined for any visual damage and then subjected to a mechanical or hydraulic test, to measure the change in mechanical or hydraulic properties. The result is expressed as the change (in percent) of the reference property. The visual damage is also reported.

5 Test specimens

5.1 Sampling

Take specimens from the samples in accordance with EN 963.

5.2 Number and dimensions of test specimens

For tensile testing, cut five specimens of 1,0 m by 0,5 m from the test sample.

Each specimen is then cut into two 1,0 m by 0,25 m test specimens, one to be used in the damage procedure, the other in the reference test.

Specimens prepared for this test, which are to be subsequently subjected to a tensile test, shall be dimensioned as required in EN ISO 10319.

When other reference tests are used, the number and dimensions of specimens shall suit the particular reference test procedure.

6 Conditioning

Condition the test specimens and conduct the tests in the standard atmosphere for testing, defined in ISO 554 i.e. at a relative humidity of (65% ± 5) % and a temperature of (20 ± 2) °C until the change in mass between successive readings made at intervals of not less than two hours does not exceed 0,25% of the mass of the test specimens.

The test shall be performed in the same atmosphere.

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

7 Apparatus

7.1 Compression Machine

A compression machine which can be controlled to produce a sinusoidal pressure of between (500 ± 10) kPa and (5 ± 5) kPa on the loading platen, at a frequency of 1 Hz.

7.2 Test Container

The test container shall be a rigid metal box, made from mild or stainless steel, of 300 mm by 300 mm minimum internal dimensions in the plane, and shall consist of two parts each 75 mm deep.

The two parts of the box shall be bolted or clipped together during the damage procedure. Shims of sufficient thickness to allow the specimen to be retained without any induced tension shall be fitted between the two parts. The lower part of the box shall be mounted on a rigid base which deflects less than 1 mm when the test load is applied directly to the base.

Figures 1 and 2 show a typical arrangement of the apparatus.

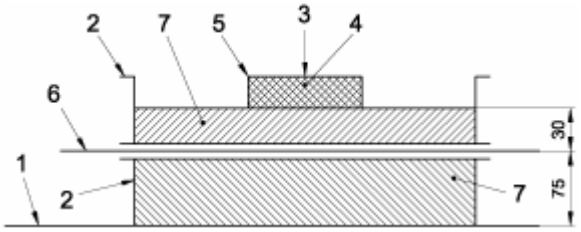

Figure 1 Section through apparatus

Key:

1 rigid base support

2 rigid metal box (in two parts, 300 mm x 300 mm plan dimensions (min))

3 Applied load (cyclic loading 5 kPa to 900 kPa at 1 Hz)

4 Spherical seating

5 Loading plate (100 mm x 200 mm)

6 Geosynthetic specimen

7 Aggregate (compacted in the lower box, loose in the upper box)

Dimensions in millimetres

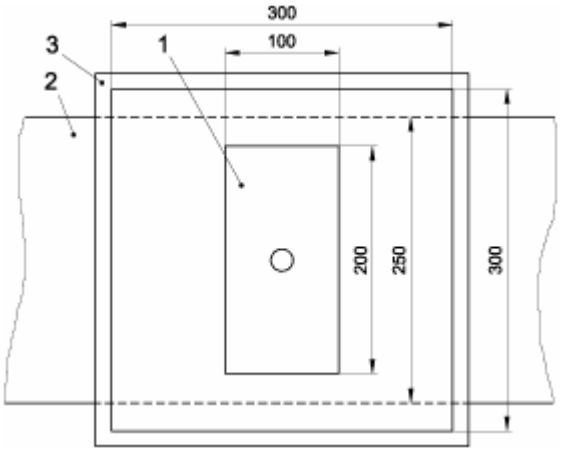

Figure 2 Plan on apparatus

Key:

1 Loading plate

2 Geosynthetic specimen (surplus rolled up carefully outside the container during the test procedure)

3 Steel container (in two parts)

Dimensions in millimetres

7.3 Loading Plate

The loading plate shall have dimensions of 100 mm by 200 mm.

The loading plate shall be constructed from steel or aluminium and shall have adequate stiffness to transmit the loading forces to the aggregate without deflection.

7.4 Aggregate

The aggregate used in the damage procedure is a sintered aluminium oxide. The properties of the aggregate shall comply with the following requirements:

— Grading: when tested in accordance with EN 933-1, 100% of the aggregate shall pass a 10 mm sieve and 0% shall pass a 5 mm sieve.

— Hardness: when tested in accordance with EN 1097-2 the aggregate shall have a Los Angeles abrasion resistance of not less than 1,9.

The aggregate shall be sieved on a 5 mm aperture sieve after every five uses and any material passing the sieve shall be discarded. The aggregate shall be totally discarded after twenty uses.

NOTE: A suitable aggregate can be obtained from Explorer srl, Viale Regina Pacis, 11, I-41049 Sassuolo (MO), Italy. This information is given for the convenience of users of this standard and does not imply an approval of the provider by CEN or ISO.

8 Procedure

8.1 Damage Procedure

Fill the lower part of the test container with the aggregate. Place the aggregate in two equal layers, each compacted with a flat plate loaded to a pressure of (200 ± 2) kPa, for 60 s, over the whole area of the test container. Strike the top layer off level with the top of the lower part of the container.

Place the specimen across the top of the lower part of the container, the centre of the specimen aligned with the centre of the container and with the free edges equally spaced from each side of the container. Roll up the free ends of the specimen outside the container in such a way that the specimen is not damaged during the test. Position the upper part of the container and bolt or clip it into position making sure the specimen is smooth, free from wrinkles but not pre-tensioned. The upper part of the container is then loosely filled with aggregate to a depth of 75 mm above the specimen.

Position the loading plate centrally in the container and apply a load of (5 ± 5) kPa. Set the loading apparatus to produce a cyclic loading of between (5 ± 5) kPa and (900 ± 10) kPa at a frequency of 1 Hz for 200 loading cycles. The pressure is determined using the area of the loading platen, not the area of the test container.

Remove the specimen carefully from the test container, ensuring that no additional damage occurs during removal.

Repeat the procedure for other specimens from the sample.

8.2 Measurement of damage

A measurement of the damage shall be made by subjecting the undamaged sub-specimen and the damaged sub-specimen to the same reference test. The reference test shall normally be EN ISO 10319, but other mechanical or hydraulic reference tests may be selected, i.e. EN ISO 12236, EN ISO 12956 or EN ISO 11058.

NOTE: The reference test to be used shall be agreed between parties prior to the commencement of the test.

Optionally the specimen is visually examined for damage and an assessment of the damage is made. The examination includes making a record of the number of holes in the specimen and a qualitative assessment of any abrasion damage.

9 Calculations

Calculate the change in the reference property as:

$$\Delta R = (R_d / R_o) \times 100$$

where:

R_d = Reference test value damaged specimen

R_o = Reference test value undamaged specimen

ΔR = Percentage retained of the reference test value (damage index)

Calculate the mean value of ΔR, the standard deviation and the coefficient of variation.

10 Test Report

The test report shall include the following information:

a) number and date of this standard;

b) identification of the sample, date of receipt and date of testing;

c) the conditioning atmosphere;

d) the temperature at which the test was carried out;

e) the orientation of the sample and specimens cut from the material roll or sheet;

f) the visual damage report;

g) the test method used to measure the reference value;

h) the mean value of the percentage retained in the reference value;

i) the standard deviation and coefficient of variation of the percentage retained of the reference value;

j) the aggregate used in the test;

k) any deviation from this procedure.