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Geosynthetics – Determination of the protection efficiency of a geosynthetic against impact damage (ISO 13428:2005)

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Geosynthetics - Determination of the protection efficiency of a geosynthetic against impact damage (ISO 13428:2005)

Géosynthétiques - Détermination de l'efficacité de protection d'un géosynthétique contre l'effet d'un impact (ISO 13428:2005)

Geokunststoffe - Bestimmung der Schutzwirksamkeit eines Geokunststoffes bei Stoßbelastung (ISO 13428:2005)

This European Standard was approved by CEN on 3 February 2005.

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Contents

Foreword

This document (EN ISO 13428:2005) has been prepared by Technical Committee CEN/TC 189 "Geosynthetics", the secretariat of which is held by IBN, in collaboration with Technical Committee ISO/TC 221 "Geosynthetics".

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of an identical text or by endorsement, at the latest by August 2005, and conflicting national standards shall be withdrawn at the latest by August 2005.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Slovakia, Slovenia, Spain, Sweden, Switzerland and United Kingdom.

Geosynthetics — Determination of the protection efficiency of a geosynthetic against impact damage

1 Scope

This International Standard describes an index test for the determination of the protection efficiency of a geosynthetic on a hard surface, exposed to the impact load of a hemispherical object.

The index test measures the change in thickness of a thin lead plate lying between the geosynthetic and a rigid support.

It can also be used as a performance test, by using the real rigid surface to protect and the real sequence of geosynthetics.

The test is applicable to all geosynthetics with apertures smaller than 15 mm (maximum size).

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the edition cited 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 9862, *Geosynthetics — Sampling and preparation of test specimens*

ISO 9863-1, *Geosynthetics — Determination of thickness at specified pressure — Part 1: Single layers*

ISO 9864, *Geosynthetics — Test method for the determination of mass per unit area of geotextiles and geotextile-related products*

EN 12588, *Lead and lead alloys — Rolled lead sheet for building purposes*

3 Terms and definitions

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

3.1
plate thickness
s
thickness of the thin lead plate

NOTE Plate thickness is expressed in millimetres.

3.2
initial plate thickness
s_i
plate thickness under an applied pressure of 2 kPa

NOTE Initial plate thickness is expressed in millimetres.

3.3
residual plate thickness
s_r
plate thickness after an impact, in the centre of the impact area

NOTE Residual plate thickness is expressed in millimetres.

3.4
probe
hemispherical mass used to produce the impact on the geosynthetic specimen

NOTE The probe is shown in Figure 3.

3.5
nominal specimen thickness
t_n
thickness of the specimen when subjected to an applied normal stress of 2 kPa, when measured in accordance with ISO 9863-1

NOTE Nominal specimen thickness is expressed in millimetres.

4 Principle

A geosynthetic test specimen is subjected to an impact load produced by a rigid probe with a hemispherical head. The probe hits the specimen with a known energy.

The specimen lies on a rigid support, consisting of a thick steel plate of set characteristics and dimensions. A thin lead plate is placed between the steel plate and the specimen.

The five specimens are each subjected to one impact. A single lead plate can be used for all five specimens.

The residual thickness of the lead plate is measured in the impacted areas and the average residual thickness is calculated.

The impact energy is given by:

$$E = F \times h \tag{1}$$

where

E is the impact energy, in joules;

F is the weight of the probe, in newtons;

h is the distance between top surface of the specimen and bottom point of the probe, in metres.

5 Test specimens

5.1 Sampling

Take specimens in accordance with ISO 9862.

5.2 Number and dimensions of test specimens

Cut five specimens for each face from the test sample. A new set of specimens is required for each test.

Specimens shall meet the following criteria:

— the shape of the specimen shall be square (see Figure 2);

— the minimum size of the specimen shall be 100 mm × 100 mm (see Figure 2).

5.3 Conditioning

The test specimens shall be conditioned in the standard atmosphere for testing at (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 weighings 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 temperature and humidity exceeding the limits. This information shall be included in the test report.

6 Apparatus (see Figure 1)

6.1 Probe

The probe is made of a steel cylinder with a hemispherical head of 20 mm diameter. It is fixed to a trigger (Figure 3).

NOTE The probe may move inside a large tube, e.g. acrylic glass, to provide protection for the operator. For performance tests, weight and diameter of the probe and the falling height can be varied in order to model the real situation.

For index tests, the falling height shall be (1 ± 0,01) m and the mass of the probe shall be (1 000 ± 2) g.

6.2 Specimen support

The specimen support with all the relevant dimensions is shown in Figure 2.

It consists of a 40 mm thick steel plate, as shown in Figure 2. The steel plate shall have minimum dimensions equal to or exceeding those of the specimens.

The steel plate shall be put on a flat rigid support, like a concrete floor, which will not bend or settle during the impact. No soft or deformable base shall be used. Before starting the test, it shall be checked that the steel plate lays perfectly on the support and that no vibration occurs when the probe impacts the specimens.

NOTE For this test, the same tube and trigger system as for the cone drop test (EN 918) may be used.