



**SLOVENSKI STANDARD**  
**oSIST prEN ISO 13428:2023**  
**01-september-2023**

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**Geosintetika - Ugotavljanje zaščitne učinkovitosti geosintetike proti poškodbam zaradi udarcev (ISO/DIS 13428:2023)**

Geosynthetics - Determination of the protection efficiency of a geosynthetic against impact damage (ISO/DIS 13428:2023)

Geokunststoffe - Bestimmung der Schutzwirksamkeit eines Geokunststoffes bei Stoßbelastung (ISO/DIS 13428:2023)

Géosynthétiques - Détermination de l'efficacité de protection d'un géosynthétique contre l'effet d'un impact (ISO/DIS 13428:2023)

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# DRAFT INTERNATIONAL STANDARD

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

*Géosynthétiques — Détermination de l'efficacité de protection d'un géosynthétique contre l'effet d'un impact*

ICS: 59.080.70

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## ISO/DIS 13428:2023(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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 2.

The main task of technical committees is to prepare International Standards. 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.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

For an explanation of the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT), see [www.iso.org/iso/foreword.html](http://www.iso.org/iso/foreword.html).

This document was prepared by Technical Committee ISO/TC 221 *Geosynthetics*.

This fourth edition cancels and replaces the third edition (ISO 13428:2005), which has been technically revised.

The main changes compared to the previous edition are as follows:

- normative references have been updated;
- the quote of fall height in [Figure 1](#) has been corrected;
- thickness of lead plate has been modified to 2,0 mm.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at [www.iso.org/members.html](http://www.iso.org/members.html).

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

## 1 Scope

This document 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 is also 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 documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 pressures — Part 1: Single layers*

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

ISO 10318-1, *Geosynthetics — Terms and definitions*

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

## 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 10318-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp>
- IEC Electropedia: available at <https://www.electropedia.org/>

### 3.1

#### lead plate thickness

*s*

thickness of the thin lead plate

Note 1 to entry: Plate thickness is expressed in millimetres.

**ISO/DIS 13428:2023(E)****3.2****initial lead plate thickness** $s_i$ 

lead plate thickness under an applied pressure of 2 kPa

Note 1 to entry: Initial plate thickness is expressed in millimetres.

**3.3****residual lead plate thickness** $s_r$ 

lead plate thickness after an impact, in the centre of the impact area

Note 1 to entry: Residual lead plate thickness is expressed in millimetres.

**3.4****probe**

hemispherical mass used to produce the impact on the geosynthetic specimen

Note 1 to entry: 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 1 to entry: 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:

$$E = F \times h \quad (1)$$

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 before releasing the trigger, in metres.

## 5 Test specimens

### 5.1 Sampling

Take specimens shall be 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 60 mm × 60 mm (see [Figure 2](#)).

### 5.3 Conditioning

The test specimens shall be conditioned in the standard atmosphere for testing at  $(20 \pm 2)$  °C and  $(65 \pm 5)$  % 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 triggering system ([Figure 3](#)).

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

For index tests, the falling height shall be  $(1\ 000 \pm 10)$  mm and the mass of the probe shall be  $(1\ 000 \pm 2)$  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.

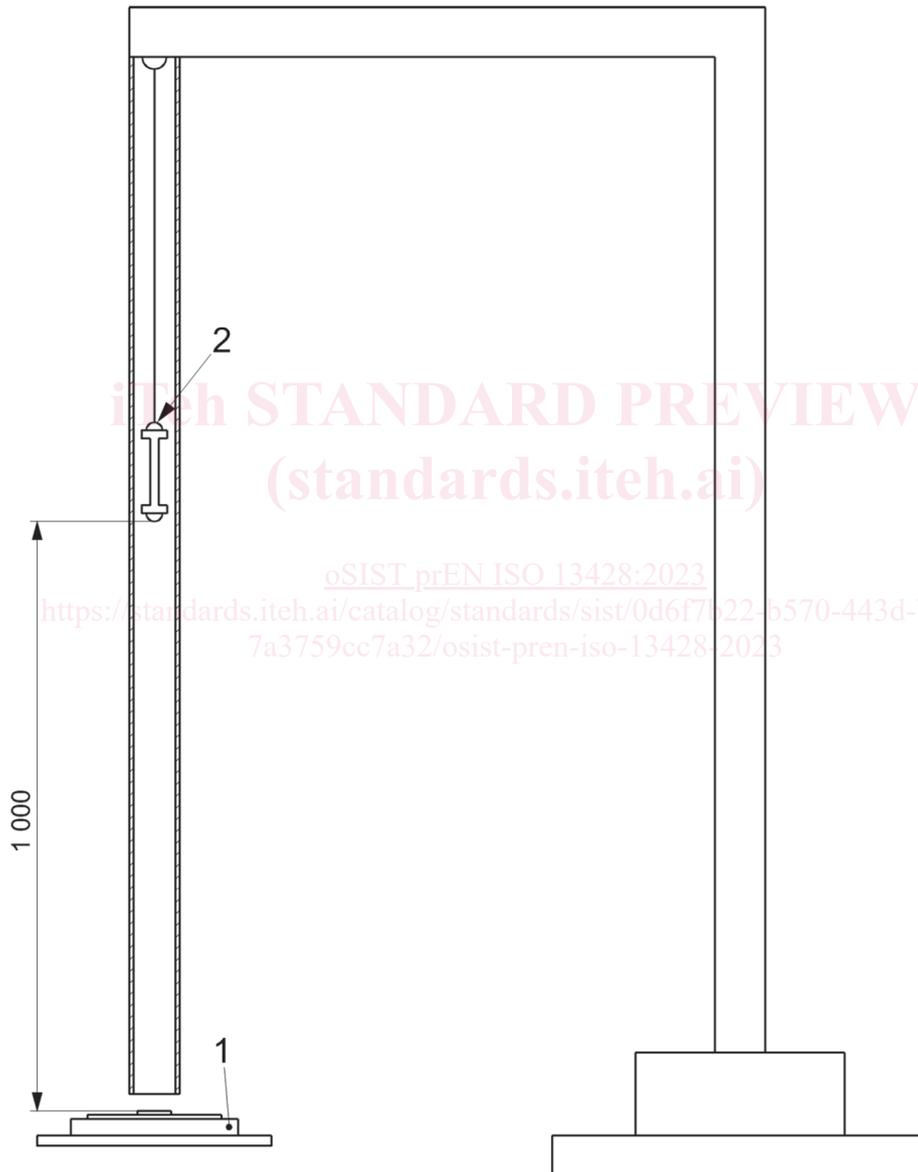
NOTE For this test, the same tube and trigger system as for the cone drop test (ISO 13433) are used.

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## 6.3 Lead plate

A soft lead plate, grade 3 according to EN 12588, is placed on the top slab. The lead plate shall have a nominal thickness of 2,0 mm. Since the actual thickness of the lead plates can have local variations of up to 20 % compared to its nominal thickness, the initial thickness in each impact area shall be measured and reported. If the initial thickness of the plate is outside the limits of  $(2,0 \pm 0,2)$  mm, the plate shall be discarded. The lead plate shall have minimum dimensions of 60 mm × 60 mm for each specimen. It is possible to use a single lead plate with minimum dimensions of 60 mm × 300 mm, divided in 5 square areas, as shown in [Fig. 2](#). When the specimen is larger than 60 mm, the lead plate's size shall be increased accordingly. Then the specimen shall be placed on the metal plate as shown in [Figure 2](#).

Dimensions in millimetres



## Key

- 1 specimen support
- 2 probe

**Figure 1 — Scheme of the testing apparatus**