



**International  
Standard**

**ISO 13428**

**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*

**Second edition  
2024-10**

ITeH Standards  
(<https://standards.iteh.ai>)  
Document Preview

[ISO 13428:2024](https://standards.iteh.ai/catalog/standards/iso/10efd801-68f8-4a68-bc8e-81ce40d27dbd/iso-13428-2024)

<https://standards.iteh.ai/catalog/standards/iso/10efd801-68f8-4a68-bc8e-81ce40d27dbd/iso-13428-2024>

iTeh Standards  
(<https://standards.iteh.ai>)  
Document Preview

[ISO 13428:2024](https://standards.iteh.ai/catalog/standards/iso/10efd801-68f8-4a68-bc8e-81ee40d27dbd/iso-13428-2024)

<https://standards.iteh.ai/catalog/standards/iso/10efd801-68f8-4a68-bc8e-81ee40d27dbd/iso-13428-2024>



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2024

All rights reserved. Unless otherwise specified, or required in the context of its implementation, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office  
CP 401 • Ch. de Blandonnet 8  
CH-1214 Vernier, Geneva  
Phone: +41 22 749 01 11  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

	Page
<b>Foreword</b> .....	<b>iv</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Principle</b> .....	<b>2</b>
<b>5 Test specimens</b> .....	<b>3</b>
5.1 Sampling.....	3
5.2 Number and dimensions of test specimens.....	3
5.3 Conditioning.....	3
<b>6 Apparatus</b> .....	<b>3</b>
6.1 General.....	3
6.2 Probe.....	3
6.3 Specimen support.....	3
6.4 Lead plate.....	4
6.5 Thickness gauge.....	5
<b>7 Test procedure</b> .....	<b>5</b>
<b>8 Calculation</b> .....	<b>6</b>
<b>9 Test report</b> .....	<b>7</b>
<b>Annex A (informative) Performance testing</b> .....	<b>8</b>
<b>Bibliography</b> .....	<b>9</b>

iTech Standards  
(<https://standards.iteh.ai>)  
Document Preview

[ISO 13428:2024](https://standards.iteh.ai/catalog/standards/iso/10efd801-68f8-4a68-bc8e-81ee40d27dbd/iso-13428-2024)

<https://standards.iteh.ai/catalog/standards/iso/10efd801-68f8-4a68-bc8e-81ee40d27dbd/iso-13428-2024>

## 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.

The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular, the different approval criteria needed for the different types of ISO document should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see [www.iso.org/directives](http://www.iso.org/directives)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO [had/had not] received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

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*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 189, *Geosynthetics*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

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

The main changes are as follows: [ISO 13428:2024](http://www.iso.org/standards/iso/10efd801-68f8-4a68-bc8e-81ce40d27dbd/iso-13428-2024)

- the normative references have been updated;
- [Figure 1](#) has been corrected;
- the 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 — Part 1: 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 plate used to assess the effect of impact

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

### 3.2

#### initial lead plate thickness

$s_i$

lead plate thickness (3.1) 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 (3.1) 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 thickness

$t_n$

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

Note 1 to entry: Nominal 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.

This test is relevant for applications like geonets protecting the coating of steel pipelines and geocomposites or geospacers protecting the geomembrane placed on the back face of a concrete retaining wall, where stones dumped during backfilling can cause an impact of the same type that is simulated in the test.

The standard index-test procedures may be modified to be used for a performance test, as described in [Annex A](#).

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

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

The impact energy is given by [Formula \(1\)](#):

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

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.