

---

---

**Geosynthetics — Determination of  
friction characteristics —**

**Part 1:  
Direct shear test**

*Géosynthétiques — Détermination des caractéristiques de  
frottement —*

*Partie 1: Essai de cisaillement direct*

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

ISO 12957-1:2018

<https://standards.iteh.ai/catalog/standards/iso/cd7ae372-bd75-47d1-aa0f-916acd99e056/iso-12957-1-2018>



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

ISO 12957-1:2018

<https://standards.iteh.ai/catalog/standards/iso/cd7ae372-bd75-47d1-aa0f-916acd99e056/iso-12957-1-2018>



**COPYRIGHT PROTECTED DOCUMENT**

© ISO 2018

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  
Fax: +41 22 749 09 47  
Email: [copyright@iso.org](mailto:copyright@iso.org)  
Website: [www.iso.org](http://www.iso.org)

Published in Switzerland

# Contents

	Page
Foreword .....	iv
<b>1 Scope .....</b>	<b>1</b>
<b>2 Normative references .....</b>	<b>1</b>
<b>3 Terms, definitions and symbols .....</b>	<b>1</b>
<b>4 Principle .....</b>	<b>3</b>
<b>5 Test specimens .....</b>	<b>3</b>
5.1 Sampling .....	3
5.2 Number and dimensions of test specimens .....	3
<b>6 Conditioning .....</b>	<b>3</b>
<b>7 Apparatus .....</b>	<b>4</b>
<b>8 Procedure .....</b>	<b>8</b>
<b>9 Calculations .....</b>	<b>9</b>
<b>10 Test report .....</b>	<b>10</b>
<b>Bibliography .....</b>	<b>12</b>

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

[ISO 12957-1:2018](https://standards.iteh.ai/catalog/standards/iso/cd7ae372-bd75-47d1-aa0f-916acd99e056/iso-12957-1-2018)

<https://standards.iteh.ai/catalog/standards/iso/cd7ae372-bd75-47d1-aa0f-916acd99e056/iso-12957-1-2018>

## 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 documents 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)).

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. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

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

For an explanation on 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 the following URL: [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 second edition cancels and replaces the first edition (ISO 12957-1:2005), which has been technically revised. The main changes compared to the previous edition are as follows:

- introduction of the possibility to test the shear between two geosynthetics;
- introduction of the possibility to test soil different from the standard sand.

A list of all parts in the ISO 12957 series can be found on the ISO website.

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 friction characteristics —

## Part 1: Direct shear test

### 1 Scope

This document specifies an index test method to determine the friction characteristics of geosynthetics in contact with a standard sand as described in EN 196-1, i.e. with a specified density and moisture content, under a normal stress and at a constant rate of displacement, using a direct shear apparatus.

The same testing procedure can be used with any type of soil with the density and moisture content that are required to evaluate the performance under specific conditions or with another geosynthetic under a normal stress and at a constant rate of displacement, using a direct shear apparatus.

The procedure can also be used for testing geosynthetic barriers.

### 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 9862, *Geosynthetics — Sampling and preparation of test specimens*

### 3 Terms, definitions and symbols

For the purposes of this document, the following terms and definitions 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 <http://www.electropedia.org/>

#### 3.1 relative displacement

*s*  
displacement of the sand, soil or other geosynthetic relative to the specimen during shearing

Note 1 to entry: Relative displacement is expressed in millimetres (mm).

#### 3.2 normal force

*N*  
constant vertical force applied to the specimen

Note 1 to entry: Normal force is expressed in kilonewtons (kN).

### 3.3

#### shear force

$S$

horizontal force measured during shearing at a constant rate of displacement

Note 1 to entry: Shear force is expressed in kilonewtons (kN).

### 3.4

#### normal stress

$\sigma$

normal force (3.2) divided by the contact area of the specimen

Note 1 to entry: Normal stress is expressed in kilopascals (kPa).

### 3.5

#### shear stress

$\tau$

shear force (3.3) along the sand, soil or other geosynthetic /geosynthetic interface, divided by the contact area of the specimen

Note 1 to entry: Shear stress is expressed in kilopascals (kPa).

### 3.6

#### maximum shear stress

$\tau_{\max}$

maximum value of shear stress (3.5) developed in a shear test

Note 1 to entry: Maximum shear stress is expressed in kilopascals (kPa).

### 3.7

#### angle of friction

$\phi$

slope of the "best fit regression straight line", through the plot of maximum shear stress (3.6)

Note 1 to entry: The angle of friction is expressed in degrees (°).

Note 2 to entry: In this document,  $\phi_{\text{sg}}$  is used to refer to the angle of friction between geosynthetic and sand, or geosynthetics and specific soil, and  $\phi_{\text{gg}}$  is used for the angle of friction between geosynthetic and geosynthetic.

### 3.8

#### apparent cohesion

$c_{\text{sg}}$

calculated value of the shear stress (3.5) on the "best fit regression straight line" corresponding to zero normal stress (3.4)

Note 1 to entry: Apparent cohesion is expressed in kilopascals (kPa).

Note 2 to entry: This term is used between geosynthetic and sand, or geosynthetics and specific soil.

### 3.9

#### maximum shear stress in sand or soil alone

$\tau_{\max, \text{s}}$

maximum shear stress (3.6) developed during a shear test on sand or soil alone

Note 1 to entry: Maximum shear stress in sand or soil alone is expressed in kilopascals (kPa).