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Second edition
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Geosynthetics — Determination of friction characteristics —

Part 2: Inclined plane test

Géosynthétiques — Détermination des caractéristiques de frottement —

Partie 2: Essai sur plan incliné

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Foreword

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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).

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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.

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).

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This second edition cancels and replaces the first edition (ISO 12957-2:2005) which has been technically revised.

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The main changes are as follows:

— minor modifications, notably in the terms and definitions;

— improvement of figures.

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.

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Geosynthetics — Determination of friction characteristics —

Part 2:
Inclined plane test

1 Scope

This document specifies a method to determine the friction characteristics of geosynthetics (geotextiles and geotextile-related products, geosynthetic barriers) in contact with soils or another geosynthetic, at low normal stress, using an inclining plane apparatus.

This test method is primarily intended as a performance test to be used with site specific soils but is also used as an index test with standard sand. It is also possible to measure the displacement of the interface over time (creep phenomenon) without necessarily reaching the slippage failure.

NOTE Test data obtained for geogrids tested with a rigid support are not necessarily realistic as the results depend on the friction support.

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 6344-2, *Coated abrasives — Determination and designation of grain size distribution — Part 2: Macrogrit sizes P12 to P220*

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

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

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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 terminology 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
normal force
N
constant vertical force applied to the specimen

Note 1 to entry: Normal force is expressed in newtons (N).

Note 2 to entry: Normal force is calculated from, firstly, the mass of materials, *W*, expressed in kilograms (kg), which is applied onto the contact area of the specimen, and secondly, the acceleration of gravity, *g*, expressed in metres per second squared (m/s^2), whose value is taken equal to 9,81 $m.s^{-2}$.

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3.2
normal stress
σ_n
normal force (3.1) divided by the specimen area that supports the weight of the materials applied onto it (contact area)

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

Note 2 to entry: The normal stress with the plane in horizontal position is noted $\sigma_{n,o}$ and the calculated normal stress at slippage failure at *angle of slipping* (3.4) β is noted $\sigma_{n,\beta}$.

3.3
angle of friction
φ
angle of the tested interface defined as the average of the values recorded in the test

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

Note 2 to entry: The angle of friction between soil and geosynthetic is noted $\varphi_{s,GSY}$ and the angle of friction between geosynthetic and geosynthetic is noted $\varphi_{GSY,GSY}$.

3.4
angle of slipping
β
angle between the plane and an horizontal line at which the box's displacement attains 50 mm

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

3.5
force to restrain the empty upper box
fr(β)
force required to restrain the empty upper box, supported by rails, when the plane is inclined at the *angle of slipping* (3.4) β

Note 1 to entry: The force to restrain the empty upper box is expressed in newton (N).

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3.6
shear stress
τ
shear force along the sand, soil or other geosynthetic or geosynthetic interface, divided by the contact area of the specimen

Note 1 to entry: The shear stress is expressed in kilopascal (kPa).

4 Principle

The angle of friction is determined by measuring the angle at which a soil filled box (with possible additional weights) slides when the base supporting the geosynthetic is gradually inclined at a constant speed.

NOTE Variations to the test described in this document are used to measure friction properties of geosynthetics in non-standard conditions, e.g.:

a) a second layer of geosynthetic is fitted in the upper part of the shear box to measure geosynthetic on geosynthetic friction;

b) normal pressures different from the standard values are applied to simulate actual site conditions;

c) the test method is also used to measure the displacement of the interface over time (creep phenomenon) without necessarily reaching the slippage failure. In this case, the test does not give a measurement of the angle of friction as depicted in this document.

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