BS EN 14574:2015

BSI Standards Publication

# Geosynthetics — Determination of the pyramid puncture resistance of supported geosynthetics

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**National foreword**

This British Standard is the UK implementation of EN 14574:2015. It supersedes BS EN 14574:2004 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee B/553, Geotextiles and geomembranes.

A list of organizations represented on this committee can be obtained on request to its secretary.

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EUROPEAN STANDARD

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# EN 14574

April 2015

ICS 59.080.70

Supersedes EN 14574:2004

English Version

# Geosynthetics - Determination of the pyramid puncture resistance of supported geosynthetics

Géosynthétiques - Détermination de la résistance au poinçonnement pyramidal des géosynthétiques sur support

Geokunststoffe - Bestimmung des Pyramidendurchdrückwiderstandes von Geokunststoffen auf harter Unterlage

This European Standard was approved by CEN on 14 February 2015.

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EUROPÄISCHES KOMITEE FÜR NORMUNG

**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

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# Foreword

This document (EN 14574:2015) has been prepared by Technical Committee CEN/TC 189 “Geosynthetics”, the secretariat of which is held by NBN.

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of an identical text or by endorsement, at the latest by October 2015, and conflicting national standards shall be withdrawn at the latest by October 2015.

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

This document supersedes EN 14574:2004.

Significant technical changes in comparison to the previous edition include:

— Annex A (informative) has been deleted.

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

# 1 Scope

This European Standard specifies an index test method to determine the puncture resistance of a geosynthetic on a rigid support.

This method simulates the efficiency of a geosynthetic protecting a geosynthetic barrier material or another contact surface against sharp rigid elements under short term loading.

# 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 485-2, *Aluminium and aluminium alloys - Sheet, strip and plate - Part 2: Mechanical properties*

EN ISO 7500-1, *Metallic materials - Verification of static uniaxial testing machines - Part 1: Tension/compression testing machines - Verification and calibration of the force-measuring system (ISO 7500-1)*

EN ISO 9862, *Geosynthetics - Sampling and preparation of test specimens (ISO 9862)*

EN ISO 10320, *Geotextiles and geotextile-related products - Identification on site (ISO 10320)*

ISO 554, *Standard atmospheres for conditioning and/or testing — Specifications*

# 3 Terms and definitions

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

**3.1**
**puncture load**
load of the piston as it is pushed onto the test specimen at a constant rate of advance

**3.2**
**push-through load**
maximum load at perforation of the geosynthetic

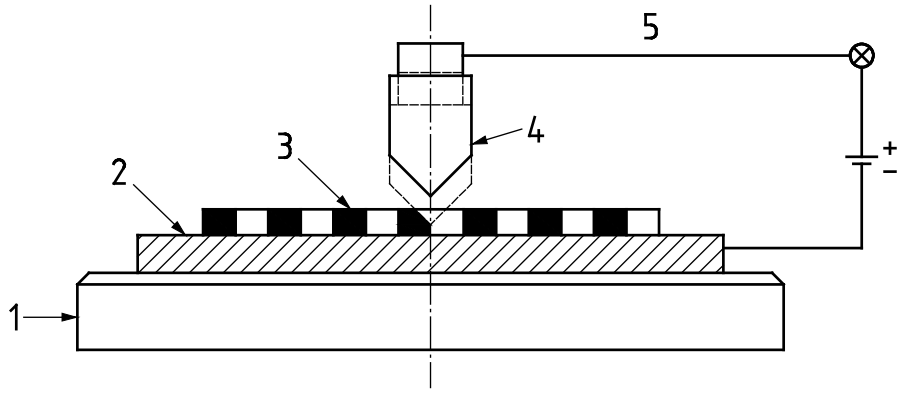
# 4 Principle

A test specimen lies flat on an aluminium plate supported by a steel base, secured in a tensile/compression testing machine. A force is exerted on the centre of the test specimen by an inverted steel pyramid, attached to a load indicator, until perforation of the specimen occurs. The recorded push-through load is considered to be representative for the protection efficiency of the specimen.

# 5 Apparatus

## 5.1 Test configuration

A suitable testing machine with a force reading accuracy according to EN ISO 7500-1 shall be used. The press shall be able to maintain a constant test speed of the loading piston. A special piston and electric signal equipment for determining the moment of push-through are the additional pieces of test equipment needed (see Figure 1).




**Key**

1 base
2 aluminium plate
3 test specimen
4 loading piston
5 electrical circuit (< 20 V DC)

**Figure 1 — Test configuration with rigid underlying aluminium plate**

## 5.2 Underlying aluminium medium

A 3 mm thick aluminium plate (AlMgSi1F32 according to EN 485-2) shall be used as the underlying medium for this test method. The aluminium plate simulates a hard, rigid support. It shall be placed on a steel base.

## 5.3 Loading piston

The upper part of the loading piston (see Figure 2) can be a cylinder with a diameter of (25,0 ± 0,1) mm or a square shape with a polished and hardened solid steel pyramid-shaped apex. The apex shall be a four sided pyramid with an apex angle of 90° rounded off with a radius (R) of (0,50 ± 0,02) mm. The edges of the pyramid shall be rounded off with a radius of (0,50 ± 0,02) mm. The transitional edge from the base of the pyramid to the cylinder or square shall have a radius (R) of (0,5 ± 0,1) mm.

Dimensions in millimetres

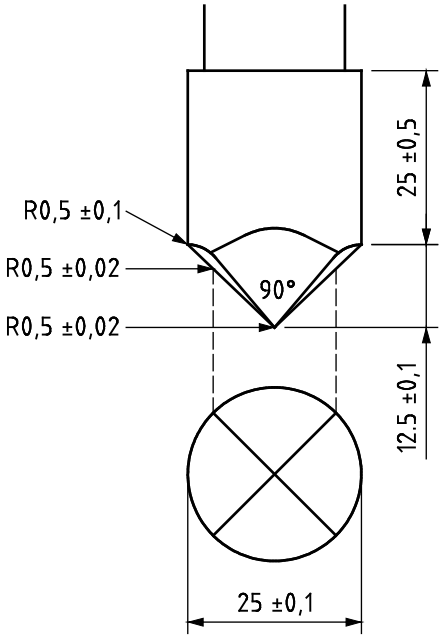



**Figure 2 — Loading piston (e.g. with cylindrical upper part)**

### 5.4 Electrical equipment for the determination of the push-through load

An electrical circuit shall be placed between the loading piston and the underlying medium in order to determine the puncture load at failure.

## 6 Specimens

### 6.1 Sampling

Take specimens in accordance with EN ISO 9862.

### 6.2 Number and dimension of specimens

Cut ten test specimens of 100 mm x 100 mm from the sample.

## 7 Conditioning

The test specimens shall be conditioned and tested in the standard atmosphere for testing ((20 ± 2) °C at (65 ± 5) % RH) as defined in ISO 554.

The specimens can be considered to have been conditioned when the change in mass in successive weightings 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 a 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.

## 8 Procedure

Select the load range of the tensile/compression testing machine such that the perforation occurs between 10 % and 90 % of the full-scale load.

Lay the test specimen flat on the smooth aluminium plate. Test at a machine speed of (1,0 ± 0,1) mm/min until the puncture load is registered by the electrical circuit between the loading piston and the aluminium plate.

Where the electrical circuit does not stop the test automatically, great care should be taken to ensure that the push-through load recorded represents the correct value.

## 9 Calculation and expression of test results

The push-through load (in N) is expressed as the arithmetic average of ten individual tests.

## 10 Test report

The test report shall include the following particulars:

a) reference number and date of publication of this European Standard;

b) identification of the sample tested according to EN ISO 10320, date of receipt;

c) conditioning atmosphere for the test, and whether tested dry or wet;

d) individual test results and average push-through load (in N);

e) coefficient of variation of push-through load (in %);

f) any deviation from this procedure.

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