



SLOVENSKI STANDARD
SIST ENV 1897:1999

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Geotekstilije in geotekstilijam sorodni izdelki - Ugotavljanje lastnosti lezenja pri tlačenju

Geotextiles and geotextiles related products - Determination of the compressive creep properties

Geotextilien und geotextilverwandte Produkte - Bestimmung des Kriechverhaltens bei Druckbeanspruchung

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Géotextiles et produits apparentés - Détermination des propriétés de fluage en compression

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ICS:

59.080.70 Geotekstilije Geotextiles

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EUROPEAN PRESTANDARD

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Descriptors: filter fabrics, compression tests, determination, creep properties, measurements, thickness

English version

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Determination of the compressive creep properties**

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REPUBLICA SLOVENIJA
MINISTRSTVO ZA ZNANOST IN TEHNOLOGIJO
Urad RS za standardizacijo in meroslovje
LJUBLJANA

SIST..... ENV 1897

PREVZET PO METODI RAZGLASITVE

-03- 1999

This European Prestandard (ENV) was approved by CEN on 1995-09-28 as a prospective standard for provisional application. The period of validity of this ENV is limited initially to three years. After two years the members of CEN will be requested to submit their comments, particularly on the question whether the ENV can be converted into an European Standard (EN).

CEN members are required to announce the existence of this ENV in the same way as for an EN and to make the ENV available promptly at national level in an appropriate form. It is permissible to keep conflicting national standards in force (in parallel to the ENV) until the final decision about the possible conversion of the ENV into an EN is reached.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart, 36 B-1050 Brussels

Foreword

This European Prestandard has been prepared by Technical Committee CEN/TC 189 "Geotextiles and geotextile-related products", the secretariat of which is held by IBN.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to announce this European Prestandard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

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1. Scope

This Standard describes methods for determining the compressive creep behaviour of geotextiles and geotextile-related products by measurement of the rate of change of thickness with respect to time.

The test specimens can be subjected either to normal compressive loading or to a combination of normal compressive loading and shear loading. Products which are to be used for carrying water in the plane of the product and which are to be subsequently tested for this function, are tested according to the procedure using a combination of normal and shear loading (see clause 6).

The tests are carried out with the specimen immersed in water, unless it can be shown that carrying out the tests in the dry does not affect the results.

2. Normative References

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate points in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references, the latest edition of the publication referred to applies.

EN 963	Geotextiles and Geotextile Related Products - Sampling and Preparation of Test Specimens.
EN 964-1	Geotextiles and Geotextile Related Products - Determination of thickness at specified pressures - Part 1 : Single Layers
prEN ISO 12958	Geotextiles and Geotextile Related Products : Determination of In-Plane Water Flow Capacity
ISO 554	Standard Atmospheres for Conditioning and/or Testing - Specification.

3. Definitions

For the purposes of this standard the following definitions shall apply.

3.1 Thickness

The distance, in millimetres between the two rigid plates in contact with the specimen at any stage in the test (see Figures 1 and 2).

3.2 Compression creep (Δt_g)

Time dependent change in thickness of a material subjected to a constant compressive load.

3.3 Nominal thickness (t_n)

The thickness, in millimetres, of the specimen when subject to an applied normal stress of 2 kPa when measured in accordance with EN 964-1.

3.4 Compressive strain (ϵ) (standards.iteh.ai)

Compressive strain is the time dependant change in thickness, expressed as a percentage of the nominal thickness.

3.5 Compressive creep collapse

Sudden increase in the rate of change of thickness of a specimen subject to a constant compressive load.

4. Test Specimens

4.1 Sampling

Take specimens in accordance with EN 963.

4.2 Number and Dimensions of Test Specimens

Cut eight specimens from the test sample for each test procedure to be followed; a new specimen is required for each test.

The size of each specimen shall satisfy the following criteria:-

- i) the shape of the specimen shall be either square or circular as shown in Figure 1;
- ii) the minimum size of the specimen shall be 100 mm x 100 mm (see Figure 1);

- iii) the length of one side of the test specimen ('a' in Figure 1) of the specimen shall be not less than five times the initial thickness of the specimen (see Figure 1);
- iv) if the specimen has a structure in which loading is resisted at defined points or areas, then the loading plate shall cover at least three of these points or areas in both directions (see Figure 2).

4.3. Conditioning

The test specimens shall be conditioned and the tests conducted in the standard atmosphere for testing, defined in ISO 554, ie. at a relative humidity at $65\% \pm 5\%$ and a temperature of $(20 \pm 2)^\circ\text{C}$. The test specimens can be considered to have been conditioned when the change in mass of the test specimen in successive weighing made at intervals of not less than 2 h does not exceed 0,25% of the mass of the test specimen.

If the test is to be carried out with the specimen immersed in water, the specimen shall be soaked in water for 24 h prior to the test. The water shall be maintained at a temperature of $(20 \pm 2)^\circ\text{C}$.

Note: Conditioning and/or testing at a specified relative humidity may be omitted if the laboratory can show that results are not affected.

5 Normal compressive load method

5.1 Principle

The geotextile specimen is placed on the fixed base of a compression machine with an upper loading plate, the vertical compressive load is applied and the change in thickness is recorded with time. The vertical compressive load is applied to the specimen for a period of 1000 h with greater or lesser times by agreement.

5.2. Apparatus

5.2.1 A suitable compression testing machine which shall have a vertical travel at least the initial thickness of the specimen. It shall be capable of sustaining the necessary pressure to within 1% accuracy for the duration of the test. The compressive stress may be applied mechanically, pneumatically, or hydraulically. The loading device, however, shall be capable of applying the full magnitude of the test load in one controlled step (no significant impact) within a period of 60 s. Some systems may use dead weights to apply the stress. At high stress levels, the magnitude of the weight may make it difficult or impossible to load the system in a controlled manner. In this case, a hydraulic jack can be used to support the weights until the test has commenced (see Figure 3).

The compression testing apparatus shall include a fixed base plate and a parallel moveable top plate with a flat steel surface. The size of the top plate shall be equal to or larger than the size of the specimen. The stiffness of the top plate shall be equal to or greater than a solid steel plate of thickness 0,1 times the length of one side of the specimen, i.e. if the specimen is 125 mm square, the top plate shall be made of steel not less than 12,5 mm thick (see Figure 2).

- 5.2.2** A container to keep the specimen immersed and at a constant temperature. The water level in the container shall cover the specimen but the depth above the specimen shall not exceed 25 mm.
- 5.2.3** A means of measuring the mean thickness of the specimen to a precision of 0,02 mm. Unless measurements are taken at the centre of the specimen, measurements shall be taken at least three equally spaced points. If three measurement points are used the thickness is the mean of the three values recorded.

Note : For low compressibility and thin samples, gauges with a higher precision may be needed to measure changes in thickness.

- 5.2.4** A timer to record times throughout the test period.

5.3 Procedure

Measure the nominal thickness of the sample in accordance with EN 964-1

Ensure that the specimen is placed symmetrically on the base plate and covered with the top plate. A load is applied to give a compressive pressure of 2 kPa. The thickness measuring apparatus shall be attached and the nominal thickness measured.

Note : With some materials it may be necessary to apply a pressure greater than 2 kPa to ensure that all of the contact points are in contact with the two loading plates.

Apply the load needed to give the required normal compressive pressure in less than 60 s.

The normal pressures to be applied shall be as follows:-

20 kPa, 50 kPa, 100 kPa and 200 kPa

A new specimen is to be used for each test, two specimens are to be tested at each of the specified pressures.

Record the thickness of the specimen at the following time intervals after the application of the test pressure:

1, 2, 4, 15, 30, 60 minutes,
2, 4, 8, 24 hours,
and 2, 4, 7, 14, 28, 42 days.

Note : The test may be terminated when the recorded thickness of the specimen is less than 10% of the nominal thickness.

Repeat the test on the other specimens. Carry out calculations as defined in clause 5.4 .

5.4. Calculations

Applied normal stress is calculated as follows:-

$$\sigma = N/A$$

where σ = normal stress in kilopascals.

N = applied load in kilonewtons.

A = area of specimen in square metres.

Compressive strain is calculated for each time interval as follows:

$$e_n = (\Delta t / t_n) \times 100$$

where

e_n = strain (%)

Δt_g = time dependant change in thickness, in millimetres

t_n = nominal thickness, in millimetres.

5.5. Test Report

The test report shall include the following information:-

- number and date of this Standard;
- identification of the sample, date of receipt and date of testing;
- conditioning atmosphere;
- whether the test was carried out dry or with the specimen immersed in water;
- the nominal thickness of the specimen at 2 kPa;
- the pressure(s) used in the test;
- the thickness of the specimens at the specified times for each of the specified pressures, in millimetres;
- the mean value of the thickness at 1000 hours for each specified pressure;
- any agreed departures from the procedure;