SLOVENSKI STANDARD
SIST EN ISO 13431:1999

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Geotekstilije in geotekstilijam sorodni izdelki - Ugotavljanje obnašanja pri lezenju pretrgu zaradi lezenja (ISO 13431:1999)

Geotextiles and geotextile-related products - Determination of tensile creep and creep rupture behaviour (ISO 13431:1999)

Geotextilien und geotextilverwandte Produkte - Bestimmung des Zugkriech- und des Zeitstandbruchverhaltens (ISO 13431:1999)

Géotextiles et produits apparentés - Détermination du comportement au fluage en traction et de la rupture au fluage en traction (ISO 13431:1999)

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English version

Geotextiles and geotextile-related products - Determination of tensile creep and creep rupture behaviour (ISO 13431:1999)

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This European Standard was approved by CEN on 23 May 1998.

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This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the Central Secretariat has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and United Kingdom.

EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

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Foreword

The text of EN ISO 13431:1999 has been prepared by Technical Committee CEN/TC 189 "Geotextiles and geotextile-related products", the secretariat of which is held by IBN, in collaboration with Technical Committee ISO/TC 38 "Textiles".

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of an identical text or by endorsement, at the latest by February 2000, and conflicting national standards shall be withdrawn at the latest by February 2000.

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

1 Scope

This Standard specifies a method for determining the tensile creep and creep rupture behaviour of geotextiles and geotextile-related products in an unconfined situation.

Application of this standard is limited to those products and applications where the risk of collapse of a structure due to premature failure or to strain/time variation of the reinforcement under constant load is of essential importance.

As the test is carried out over a long period of time and the procedure is complex, it is therefore recommended that the test is not considered to be a routine quality control test. The results of the test may not be representative of the performance of the products when subject to soil pressures.

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 ISO 10319	Geotextiles - Wide-width tensile test (ISO 10319:1993)
ISO 554	Standard atmospheres for conditioning and/or testing - Specifications.

3 Definitions

For the purposes of this standard the following definitions apply:

3.1 tensile strength: Maximum load per unit width, in kilonewtons per metre, developed in a specific material subjected to an external tensile load, when measured in accordance with EN ISO 10319.

3.2 preload: Force, in kilonewtons per metre, equal to 1% of the tensile strength, but not more than 10% of the tensile creep load, applied to the specimen to enable the gauge length and strain zero to be determined under reproducible conditions.

3.3 nominal gauge length: Initial distance between two reference points located on the specimen parallel to the applied load before the application of the preload. The gauge length should be set to be completely clear from the clamping devices. The gauge length should be a representative part of the specimen, e.g. for grid structures the gauge length should be a whole number of meshes or ribs.

3.4 technically representative width (TRW): A small width, that exhibits tensile strength/ strain characteristics per unit width, under identical test conditions, within ± 5% for tensile strength and ± 20% for strain at the maximum load, of the values measured in accordance with EN ISO10319.

3.5 tensile creep strain: Time dependent change in tensile strain of a specimen subject to a constant tensile load.

3.6 tensile creep rupture: Tensile failure of a specimen subject to a constant tensile load, which is less than the tensile strength.

NOTE: In some materials tensile creep rupture is preceeded by an increasing rate of strain.

3.7 tensile creep load: Constant tensile static load per unit width, in kilonewtons per metre, applied to the specimen.

NOTE: The tensile creep load is usually expressed as a percentage of the tensile strength of the sample. The tensile creep load includes the preload and, if applicable, any load due to the loading device.

3.8 loading time: Time, in seconds, required to apply the full tensile creep load.

3.9 creep time: Time elapsed from the end of the loading time.

3.10 time to creep rupture: Time elapsed from the end of the loading time until tensile creep rupture of the specimen.

3.11 initial strain: Change in the gauge length (strain), in percent, measured on the specimen at (60 ± 5) s after the end of the loading time.

3.12 lateral contraction: Decrease in the width of the specimen during the tensile test, expressed as a percentage of the width of the specimen under preload, measured at the centre of the gauge length (see figure 2).

4 Specimens

4.1 Sampling

Take a sample and prepare specimens in accordance with EN 963.

4.2 Number of specimens

For the determination of tensile creep behaviour (see clause 5), cut four specimens from the sample.
For the determination of tensile creep rupture (see clause 6), cut twelve specimens from the sample.

4.3 Dimensions of specimens

4.3.1 The size of the specimens is determined:

- to suit the dimensions of the apparatus being used;
- to suit the accuracy of the measuring equipment being used;
- to comply with the technically representative width;
- to allow the minimum gauge length to be established within the grips such that there is a distance of not less than 20mm between either end of the marked gauge length and the grips.

4.3.2 The minimum gauge length of the specimens shall be (see figure 1):

- not less than 200 mm;
- for geogrids not less than two full elements;
- for all samples, such length as will enable the measurement of the gauge length to an accuracy of ± 0,1 %.

4.3.3 The width of the specimens shall be:

- for products which exhibit significant lateral contraction (≥10%), when tested in accordance with EN ISO 10319 (see figure 2): 200 mm;
- for geogrids: not less than three full elements;
- for all other materials: a technically representative width.

NOTE: The size of the specimens has a major influence on the feasibility and the accuracy of the test. The loads required are dependent upon the width of the specimen.

4.4 Conditioning

Condition the test specimens in a standard atmosphere for testing defined in ISO 554, until the change in mass between successive readings made at intervals of not less than 2 h does not exceed 0,25 % of the mass of the specimens.
Tests shall be carried out under the same conditions.

> NOTE: Conditioning and/or testing at a specified relative humidity may be omitted if it can be shown that the results are not affected by this omission. As this test is carried out over a long period of 1 000 h, the omission of humidity control should be based upon experimental evidence from tests carried out over a similar period of time on similar samples of the same polymer.

5 Determination of tensile creep behaviour

5.1 Principle

The specimens are loaded with a constant static force, in constant ambient conditions of temperature and humidity.

The load is distributed evenly across the specimen width.

The elongation of the specimen is recorded continuously or is measured at specific time intervals. The load is maintained for a period of 1000 h. If the specimen fails before 1000 h the time to rupture is recorded.

Specimens from the sample shall first be tested in accordance with EN ISO 10319 to determine the tensile strength and the TRW of the sample.

5.2 Apparatus

5.2.1 General

A schematic representation of suitable equipment is shown in figures 3 and 4.

The apparatus shall consist of a device to grip the specimen without slipping, a loading system and a system to measure the change in gauge length with time.

5.2.2 Specimen grips

The grips shall be wide enough to hold the specimen firmly across the full width. The grips shall hold the specimen without slippage and in a way which does not cause any damage to the specimen, which can in turn result in failure of the specimen in the grips.

The grips shall be fixed to the loading system in such a way that the load is applied to the specimen without any eccentricity, i.e. by using a universal joint or spherical seating.

5.2.3 Loading system

The loading frame shall be stiff enough to support the loads without apparent deformation.

The loading frame shall be insulated from vibrations from outside sources.

The loading frame shall not be susceptible to the disturbance caused by the failure of other specimens in the frame, in adjacent frames or by any other means.

The tensile creep load shall be constant within ±1%.

The tensile creep load may be applied using weights acting directly or through a system of levers, or by the use of mechanical, hydraulic or pneumatic systems. The loading system shall be calibrated before each test to demonstrate that the required load is being applied to the specimen.

NOTE: Special attention may be needed to ensure that the tensile creep load is constant when using loading systems other than dead loads, e.g. the angle of lever systems should be kept nearly constant to ensure that the applied creep load remains within the accuracy specified.

The loading system shall be capable of applying the preload to the specimen.

The loading system shall allow the specimen to be loaded smoothly, such that the full tensile creep load is applied in not more than 60 s.

5.2.4 Strain measuring system

The change in the gauge length or strain, shall be measured between two parallel lines across the full width of the specimen or between two points on the central axis of the specimen in the loaded direction.

The change in the gauge length may be measured with any apparatus which is able to measure the change with an accuracy of ± 0,1% of the gauge length; a mechanical, electrical or optical apparatus is normally used.

NOTE 1: Extreme care should be taken to ensure the reproducibility of the readings and the long-term stability of the apparatus. The apparatus may be connected to a continuous reading system or data logger, or the changes in length can be measured at the specific time intervals given in 5.3.