SLOVENSKI STANDARD
SIST ENV 12225:1999

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Geotekstilije in geotekstilijam sorodni izdelki - Metoda ugotavljanja mikrobiološke odpornosti s preskusom zakopavanja v zemljo

Geotextiles and geotextile-related products - Method for determining the microbiological resistance by a soil burial test

Geotextilien und geotextilverwandte Produkte - Prüfverfahren zur Bestimmung der mikrobiologischen Beständigkeit durch einen Erdeingrabungsversuch

Géotextiles et produits apparentés - Méthode pour la détermination de la résistance microbiologique par un essai d'enterrement

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ICS:

07.100.99	Drugi standardi v zvezi z mikrobiologijo	Other standards related to microbiology
59.080.70	Geotekstilije	Geotextiles

SIST ENV 12225:1999 **en**

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English version

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CEN

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

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Foreword

This European Standard 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 organisations of the following countries are bound to implement this European Prestandard: Austria, Belgium, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

1 Scope

This prestandard specifies a method for the determination of the microbiological resistance of geotextiles and geotextile-related products by a soil burial test. It does not specify for which products or in which applications the soil burial test is required.

NOTE: Experience and exhumation of geotextiles and geotextile-related products which had performed successfully, in some cases for more than two decades, indicate that geotextiles and geotextile-related products made out of plastic materials are generally resistant against microbially initiated decay. It can therefore be expected that most of these products commercially available at the present time will pass the soil burial test successfully and it is probably not necessary to submit them all to this test independent of their function. However, if the requirements for appropriate functioning of the geotextiles and geotextile-related products demand proof of microbiological resistance or if they are manufactured from newly developed polymers whose resistance is in any doubt, the soil burial test should be performed.

2 Normative references

This European prestandard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places 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.

ENV 12226	Geotextiles and geotextile-related products - General tests for evaluation following durability testing
prEN ISO/DIS 11721-1	Textiles - Determination of resistance of cellulose containing textiles to micro-organisms - Soil burial test

3 Definitions

For the purposes of this ENV the following definitions apply:

3.1 Microbiological resistance: the resistance of a geotextile or geotextile-related product to attack by bacteria or fungi.

NOTE: There are no limit values on evaluation criteria. Anything which exhibits statistically significant degradation in the laboratory under optimal conditions cannot be rot resistant in practice.

3.2 Saturation moisture content (SMC): the water content of the soil at 100% saturation.

NOTE: prEN ISO/DIS 11721-1 uses the term "water holding capacity" (WHC).

3.3 Water content (w): the ratio of the mass of the water to the mass of the dry solid substances, expressed in per cent.

$$w = \frac{m_w}{m_s} = \frac{\text{mass of soil as used - mass of oven dried soil}}{\text{mass of oven dried soil}} \times 100\ \%$$

wherein m_W = mass of water
m_S = mass of solids

4 Principle

The test consists of exposing test specimens to microbially active soil under specified conditions. At the end of the exposure, the test specimens are evaluated visually, both before and after cleaning, and tested by measuring physical properties. These test results are compared with those obtained on unexposed specimens in accordance with ENV 12226.

5 Reagents and apparatus

5.1 Test soil

The test soil shall contain a variety of micro-organisms. To favour the optimum activity of the entire microbial population, the moisture content of the test soil shall be 60% of SMC when determined according to prEN ISO/DIS 11721-1, method A2. Natural soil collected in the field shall be sieved and all particles greater than 4 mm diameter removed.

The water content is determined by drying 100 g of the soil in a thin layer at 103 °C to 105 °C until the mass remains constant to within 1% (normally 24 h). If the water content of the test soil is too high, dry it in thin layers in the laboratory atmosphere. Do not heat since this might affect the microflora. If necessary use a solution of 1 g ammonium nitrate and 0.2 g dipotassium-hydrogen phosphate per 1 l of water to increase the water content.

To establish a constant microbial activity of the test soil, the soil shall be acclimatised prior to the soil burial test. The method consists of a preliminary incubation for at least one month at (97 ± 2) % relative humidity and about 28 °C for a freshly obtained soil. If the same soil material is used more than once, then for each new test set up half of the old material shall be replaced by fresh soil material in the manner described above.

NOTE: Good experience has been gained with soil type John Innes No.2, or with Einheitserde ED 73, a soil which contains 66% of ashable substances and 0,24% of nitrogen, the pH-value of the 10% suspension is 5,2 and the SMC = 185%.

5.2 Cotton fabric

Strips, 100 mm long and 25 mm wide, of a bleached and untreated woven cotton fabric, mass per unit area about 250 g/m^2, shall be used as a reference to test the biological activity of the soil.

5.3 Microbicides

An ethanol - water mixture 70:30 shall be used as a cleaning and disinfectant fluid after the soil burial test.

5.4 Containers

The size and shape of the containers shall be such that the test specimens can be buried in a 100 to150 mm depth of test soil. The dimensions of the containers should facilitate easy handling and placement in the incubation chamber. A cover is not needed. If the containers are covered, it is necessary to provide the covers with ventilation openings for the access of oxygen to the test soil.

6 Specimens

Prepare 10 specimens according to ENV 12226 for each set of conditions. Store the control specimens at (20 ± 2) °C and (65 ± 5) % relative humidity.

7 Test climate

A dark chamber with admission of fresh air and air ventilation controlled at (97 ± 2)% relative humidity and (28 ± 1)°C shall be used to maintain the moisture content of the test soil at 60% of SMC.The climate of the incubator shall ensure that neither drying nor addition of water to the test soil during a test time of several weeks influences the performance of the microbes, and that ventilation of the test soil is not prevented.

8 Procedure

8.1 Biological activity of the soil

Bury strips of the cotton fabric as described in 5.2 and keep them in the test soil for seven days. After this exposure the tensile strength of the cotton strips shall be ≤ 25% of the original tensile strength. If this criterion is not met, the soil shall be replaced by a biologically more active soil. The biological activity of the test soil shall be checked during the soil burial test according to 8.2 by adding a cotton strip to the test. On completion of the exposure, this strip shall have been destroyed.

8.2 Testing of specimens

8.2.1 Active test

For the active test, set up at least two containers for each incubation time. The duration of the test shall be 16 weeks. Place a minimum of two test specimens and one cotton strip in each of the soil containers. Bury the specimens approximately 100 mm deep and ensure good contact between them and the test soil. The container shall permit free oxygen exchange, and shall therefore not be closed.

8.2.2 Incubation

Place the test containers prepared according to 8.2.1 in an incubator for 16 weeks at the climatic conditions specified under clause 7.

Note: For index tests, the test duration is 16 weeks. During the development of new geotextiles and geotextile-related products a prolonged test of 32 weeks may be used.

Control the moisture content to 60% SMC by verifying the mass of the soil in the vessels every four weeks. If necessary, ammonium nitrate - dipotassium hydrogen phosphate solution shall be added.

8.2.3 Cleaning of test specimens

Recover the test specimens from the soil, strip off the soil, and submerge all specimens including the controls in an ethanol-water solution (70:30) for 300 s. Then clean the specimens under running water, wipe with absorbent paper and dry for at least 72 h at (20 ± 2) °C and (65 ± 5) % RH.

8.2.4 Evaluation tests

Carry out tests in accordance with ENV 12226. The change in mass shall not be determined since it is too difficult to eliminate all particles attached to the specimens after the soil burial test.

9 Test report

The test report shall include the following particulars:

a) reference to this European prestandard;
b) identification of the sample;
c) number of tested specimens;
d) test set up and execution: type of soil, type of containers, type of cotton fabric;
e) preparation of test soil, percentage of fresh test soil;
f) test conditions: water content and biological activity of test soil, temperature and relative humidity;
g) duration of test: date of start and end of soil burial;
h) results of visual examination and microscopic inspection, including magnification factor;