SLOVENSKI STANDARD
SIST ENV 12224:1999

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Geotekstilije in geotekstilijam sorodni izdelki - Ugotavljanje odpornosti proti staranju

Geotextiles and geotextile-related products - Determination of the resistance to weathering

Geotextilien und geotextilverwandte Produkte - Bestimmung der Alterungsbeständigkeit

Géotextiles et produits apparentés - Détermination de la résistance aux essais climatiques

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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.

Introduction

The effect of weathering on the properties of geotextiles and geotextile-related products is of technical importance for many of their applications. Since natural weathering requires testing at long durations, there is a need to obtain information more rapidly and reproducibly by accelerated procedures. For this purpose weathering devices with specific artificial light sources are used.

1. Scope

This European prestandard specifies methods for the exposure of geotextiles and geotextile-related products to weathering conditions more intense than those of natural weathering.

The following types of light sources are included:

- xenon-arc lamps in accordance with ISO 4892-2
- fluorescent UV lamps in accordance with ISO 4892-3.

This is an index test whose purpose is to differentiate products with little or no resistance to weathering exposure from those which do have this resistance.

2. Normative references

This European Standard 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
ISO 4892-1	Plastics - Method of exposure to laboratory light sources - Part 1: General guidance
ISO 4892-2	Plastics - Method of exposure to laboratory light sources - Part 2: Xenon-arc sources
ISO 4892-3	Plastics - Method of exposure to laboratory light sources - Part 3: Fluorescent UV lamps.

3. Principle

Specimens of the material to be tested are exposed to a light source for a defined radiant exposure or exposure time and at recommended temperature and moisture conditions. After this exposure the change in performance of these specimens is determined.

4 Apparatus

4.1 Laboratory light sources

4.1.1 General

To improve the correlation with outdoor exposure it is necessary that the spectrum of the light source be as near as possible to that of solar global radiation, particularly in the ultraviolet region because polymers are generally very sensitive to changes in this spectral region.
The xenon-arc lamp, when appropriately filtered, produces radiation with a distribution of spectral irradiance similar to that of average UV and visible part of solar global radiation. Fluorescent tubes can be selected to have a spectral output corresponding to that of the actinic ultraviolet region in solar global radiation.
Temperature of the specimen influences the result of the exposure test. The xenon-arc lamp produces a large proportion of infrared radiation which is reduced by filters. Efficient cooling of samples is necessary to prevent overheating. Fluorescent tubes produce little infrared radiation and there is generally no problem. However, the ambient temperature shall be controlled. Surface temperature of specimens is an essential test parameter. Generally, degradation processes run faster with increasing temperature.
Apparatus with two different light sources may be used in this standard.

4.1.2 Xenon-arc lamps in accordance with ISO 4892-2

Spectral irradiance of UV radiation of filtered xenon-arc lamps shall be as given in table 1.

Table 1 - Xenon-arc lamps - spectral irradiance

Wavelength (λ) nm	Spectral irradiance W/m²
< 290	0,0
290 to 320	3,3 ± 1,1
320 to 360	23 ± 2,5
360 to 400	33 ± 5,0

NOTE: Spectral irradiance in table 1 is based on an irradiance of 550 W/m² in the spectral band between 290 nm and 800 nm, as recommended in ISO 4892-2.

4.1.3 Fluorescent tubes in accordance with ISO 4892- 3.

Spectral irradiance of UV radiation of fluorescent lamps shall be as given in Table 2.

Table 2 - Fluorescent UV lamps - spectral irradiance

Wavelength (λ) nm	Spectral irradiance W/m²	
	Type I (340)	Combination of different types of lamps
290 to 320	3,10	6,00
320 to 360	25,10	22,00
360 to 400	11,00	18,00

The characteristics of lamps and filters change in use due to ageing and they shall be replaced at appropriate intervals as recommended by manufacturers of the lamps.

4.2 Temperature monitoring system - black standard thermometer

Mount a black standard thermometer in accordance with ISO 4892 instead of a specimen holder with the blackened metal side facing the lamp and readings are taken after sufficient time for the temperature to become steady.
The black standard temperature may be controlled by adjustment of the cooling air circulation.

NOTE: The temperature is controlled by a black panel thermometer or black standard thermometer, since it is not practical to monitor the individual specimen temperatures.

4.3 Means of determining radiant exposure

When appropriate, a radiation meter, in accordance with ISO 4892-1, may be included to measure the radiance E at the face of the specimen and the total radiant exposure H.
Mount the radiation meter on a support for a test panel in such a way that it receives the same radiation as a flat specimen on the same support would receive, and locate it either at the specimen distance or where it has a sufficient field of view with the detector calibrated for irradiance (for the calibration procedure: see ISO 4892-1).
The irradiance E in the UV-wavelength range 300 nm to 400 nm or at a specific wavelength in UV (for example at 340 nm) shall be stated in the test report. In xenon-arc lamp devices the irradiance E may additionally be measured in the UV and visible wavelength range 300 nm to 800 nm.
A direct comparison of the UV radiant exposure measured in the weathering apparatus with that measured during natural weathering is possible if in both cases a radiation meter as prescribed above is used. If, for the natural weathering, there are only data for the total radiant exposure, the radiant exposure value obtained in the wavelength range from 280 nm to 400 nm is multiplied by the appropriate factor specific to the apparatus by which the portion of the global radiation of wavelength from 400 to 2450 nm is also taken into account.

4.4 Specimen holders

Specimens shall be positioned between two stainless steel grids of mesh size 15 mm to 20 mm and wire diameter of about 1 mm (transmitting area 87 % to 90 % of total area).

5. Test conditions

5.1 Test conditions for xenon-arc lamps:

See 4.1.2

5.1.1 Black standard temperature

The black standard temperature shall be (65 ±3) °C.

NOTE: A higher temperature may be specified in some situations, but this will increase the tendency for thermal degradation effect to influence the test results.

If water spray is used the temperature requirements apply to the end of the dry period. If the thermometer does not attain equilibrium during a short dry cycle the specified temperature shall be established without water spray and the maximum temperature attaining during the dry cycle shall be reported.

5.1.2 Relative humidity

The relative humidity used shall be (50 ±5) % or as agreed otherwise by interested parties. It shall be reported.

NOTE: The relative humidity of the air as measured in the test chamber is higher than the relative humidity of the air very close to the specimen surface owing to the varying temperatures of test specimens having different colours and thicknesses.

5.1.3 Spray cycle

The spray cycle used shall be as follows unless agreed otherwise by interested parties:

Table 3: Spray cycle

Time of spraying in minutes	Dry interval between spraying in minutes
18	102

The spray system shall be made from inert materials which do not contaminate the water employed.