SLOVENSKI STANDARD
oSIST prEN 17033:2016

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Polimerni materiali - Biorazgradljive folije za mulčenje za uporabo v kmetijstvu in vrtnarstvu - Zahteve in preskusne metode

Plastics - Biodegradable mulch films for use in agriculture and horticulture - Requirements and test methods

Kunststoffe - Biologisch abbaubare thermoplastische Mulchfolien für den Einsatz in Landwirtschaft und Gartenbau - Anforderungen und Prüfverfahren

Plastiques - Films de paillage biodégradables pour utilisation en agriculture et horticulture - Exigences et méthodes d'essai

Ta slovenski standard je istoveten z: **prEN 17033**

ICS:

83.140.10	Filmi in folije	Films and sheets

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Plastics - Biodegradable mulch films for use in agriculture and horticulture - Requirements and test methods

Plastiques - Films de paillage biodégradables pour utilisation en agriculture et horticulture - Exigences et méthodes d'essai

Kunststoffe - Biologisch abbaubare thermoplastische Mulchfolien für den Einsatz in Landwirtschaft und Gartenbau - Anforderungen und Prüfverfahren

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EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
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European foreword

This document (prEN 17033:2016) has been prepared by Technical Committee CEN/TC 249 “Plastics”, the secretariat of which is held by NBN.

This document is currently submitted to the CEN Enquiry.

1 Scope

This draft European Standard specifies the requirements for biodegradable films, manufactured from thermoplastic materials, to be used for mulch applications in agriculture and horticulture.

This draft European Standard is applicable to films intended to biodegrade in soil without creating any adverse impact on the environment.

It also specifies the test methods to assess these requirements as well as requirements for the packaging, identification and marking of films.

For information, it defines a classification of biodegradable mulch films according to their service life on soil and gives a good practice guide for the use of the films.

NOTE Films intended to be removed after use and not incorporated in the soil are not in the scope of this standard. See EN 13655 [1].

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 15408, *Solid recovered fuels — Methods for the determination of sulphur (S), chlorine (Cl), fluorine (F) and bromine (Br) content*

EN ISO 472, *Plastics — Vocabulary (ISO 472)*

EN ISO 527-1, *Plastics — Determination of tensile properties — Part 1: General principles (ISO 527-1)*

EN ISO 527-3, *Plastics — Determination of tensile properties — Part 3: Test conditions for films and sheets (ISO 527-3)*

EN ISO 7765-1:2004, *Plastics film and sheeting — Determination of impact resistance by the free-falling dart method — Part 1: Staircase methods (ISO 7765-1:1988)*

EN ISO 11268-1, *Soil quality — Effects of pollutants on earthworms — Part 1: Determination of acute toxicity to Eisenia fetida/Eisenia andrei (ISO 11268-1)*

EN ISO 11274, *Soil quality — Determination of the water-retention characteristic — Laboratory methods (ISO 11274)*

EN ISO 12846, *Water quality — Determination of mercury — Method using atomic absorption spectrometry (AAS) with and without enrichment (ISO 12846)*

EN ISO 17294-2, *Water quality — Application of inductively coupled plasma mass spectrometry (ICP-MS — Part 2: Determination of 62 elements (ISO 17294-2)*

EN ISO 17556:2012, *Plastics — Determination of the ultimate aerobic biodegradability of plastic materials in soil by measuring the oxygen demand in a respirometer or the amount of carbon dioxide evolved (ISO 17556:2012)*

ISO 4591, *Plastics — Film and sheeting — Determination of average thickness of a sample, and average thickness and yield of a roll, by gravimetric techniques (gravimetric thickness)*

ISO 4592, *Plastics — Film and sheeting — Determination of length and width*

ISO 4593, *Plastics — Film and sheeting — Determination of thickness by mechanical scanning*

ISO 10390, *Soil quality — Determination of pH*

ISO 15685, *Soil quality — Determination of potential nitrification and inhibition of nitrification — Rapid test by ammonium oxidation*

OECD 208, *OECD Guidelines for the Testing of Chemicals, Section 2, Effects on Biotic Systems — Test No. 208: Terrestrial Plant Test: Seedling Emergence and Seedling Growth Test*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 472 and the following apply.

3.1 Definitions related to films

3.1.1
mulch film
film made from thermoplastic material intended to be used in agriculture and horticulture to cover the ground in order to improve growing conditions of crops

3.1.2
width
overall width of a film when lying flat

Note 1 to entry: It is expressed in millimetres (mm).

3.1.3
nominal width
width of a film, as declared by the manufacturer

Note 1 to entry: It is expressed in millimetres (mm).

3.1.4
thickness
thickness at any point of a film

Note 1 to entry: It is expressed in micrometres (µm).

3.1.5
nominal thickness
thickness of a film, as declared by the manufacturer

Note 1 to entry: It is expressed in micrometres (µm).

3.1.6
roll length
largest dimension of the film corresponding to the length of the unwinded roll

Note 1 to entry: It is expressed in metres (m).

3.1.7
nominal roll length
roll length, as declared by the manufacturer

Note 1 to entry: It is expressed in metres (m).

3.1.8
longitudinal direction
MD
direction parallel to the roll length, corresponding to the extrusion direction

3.1.9
transverse direction
TD
direction parallel to the width (at a right angle to the roll length)

3.1.10
radiant exposure
H
time integral of irradiance, measured in joules per square metre ($J.m^{-2}$)

[SOURCE: ISO 9370:2009, 3.27]

3.2 Definitions related to biodegradation and disintegration

3.2.1
ultimate aerobic biodegradation
breakdown of an organic compound by microorganisms in the presence of oxygen into carbon dioxide, water and mineral salts of any other elements present (mineralization) plus new biomass

[SOURCE: ISO 17088:2012, 3.10]

3.2.2
disintegration
physical breakdown of a material into very small fragments

[SOURCE: ISO 17088:2012, 3.6]

3.2.3
photodegradation
degradation identified as resulting from the action of the light

3.2.4
total dry solids
amount of solids obtained by taking a known volume of test material or compost and drying at about 105 °C to constant mass

[SOURCE: ISO 17088:2012, 3.9]

3.2.5
volatile solids
amount of solids obtained by subtracting the residue of a known volume of test material or compost after incineration at about 550 °C from the total dry solids of the same sample

Note 1 to entry: The volatile-solids content is an indication of the amount of organic matter present.

[SOURCE: ISO 17088:2012, 3.11]

3.2.6
constituent
every pure chemical material or substance of which a thermoplastic material is composed

3.3 Definitions related to test soil

3.3.1
natural soil
soil collected from the surface layer of fields and/or forests

3.3.2
standard-soil
soil made from a defined mixture of industrial quartz sand, clay, natural soil and mature compost, as defined in EN ISO 17556:2012, 8.3.2

3.4 Definitions related to ecotoxicity

3.4.1
mineralization
decomposition of organic matter or organic substances into carbon dioxide, water and the hydrides, oxides or other mineral salts

[SOURCE: ISO 11074:2005, 3.3.11]

3.4.2
microbial activity
metabolic performance of microorganisms

[SOURCE: EN ISO 16072:2011, 3.3]

3.4.3
substances of very high concern
SVHC
substances covered by legal provisions laid down in Regulation (EC) No 1907/2006 [2]

4 General requirements

In order to meet the requirements of this draft European Standard, the material of the mulch film under investigation shall fulfil all the requirements given in Clause 5 and the mulch film shall fulfil all the requirements given in Clause 6. If not, no reference to this draft European Standard shall be made.

5 Requirements for materials, testing schemes and evaluation criteria for biodegradation and ecotoxicity

5.1 Control of constituents

5.1.1 Regulated metals and other substances

The concentrations of regulated metals and other substances in the material under investigation shall not exceed the limits as described in Table 1.

Table 1 — Maximum concentrations of regulated metals and other substances

Element	Maximum concentration[a] [b] mg/kg of dry matter	Test method
As	5	EN ISO 17294-2
Cd	0,5	EN ISO 17294-2
Co	38	EN ISO 17294-2
Cr	50	EN ISO 17294-2
Cu	50	EN ISO 17294-2
F	100	EN 15408
Hg	0,5	EN ISO 12846
Ni	25	EN ISO 17294-2
Mo	1	EN ISO 17294-2
Pb	50	EN ISO 17294-2
Se	0,75	EN ISO 17294-2
Zn	150	EN ISO 17294-2

[a] As per EN 13432 [3] requirements, except for Co. The maximum metal concentrations for the EC are 50 % of those prescribed in ecological criteria for the award of the Community eco-label to soil improvers (EC OJ L 219, 7.8.1998, p. 39).

[b] For Co, the maximum concentration is from the certification program CAN/BNQ 9011–911-I/2007 [4].

5.1.2 Substances of very high concern (SVHC)

The material under investigation may not contain substances of very high concern (SVHC):

a) that exceed the concentration limits given in Article 56 (paragraph 6) of Regulation (EC) No 1907/2006 [2];

b) which appear on the Candidate List of substances of very high concern for Authorization [5].

5.1.3 Volatile solids

Materials used for the manufacture of mulching products shall contain not less than 60 % by mass of volatile solids, which largely excludes inert products.

5.1.4 Identifying characteristics

The mulch film shall be identified as follows:

a) information regarding the constituents of the mulch film shall be obtained or declared and recorded;

b) regulated metals and other substances (5.1.1) shall be determined and reported;

c) information on the use of substances of very high concern (SVHC) (5.1.2) shall be recorded based on a self-declaration;

d) volatile solids (5.1.3) shall be determined and reported.

5.2 Biodegradation

5.2.1 Evaluation criteria

Test samples shall not be subjected to conditions or procedures, such as a pretreatment by heat and or an exposure to radiation exposure, designed to accelerate biodegradation prior to testing according to EN ISO 17556.

A mulch film is considered to have demonstrated a satisfactory rate and level of biodegradation in soil if:

a) when tested in accordance with EN ISO 17556, it achieves a minimum biodegradation percentage as specified hereunder within a test period no longer than 24 months;

b) 90 % of the organic carbon shall have been converted to CO_2 by the end of the test period (relative to a reference material). Both the reference material and the test item shall be tested for the same length of time and the results compared at the same point in time after the activity of both has reached a plateau;

c) as an alternative, 90 % (in absolute terms) of the organic carbon shall have been converted to carbon dioxide by the end of the test period.

Test environment: temperature constant to within ± 2 °C in the range between 20 °C and 28 °C, preferably 25 °C.

Use as reference material a well-defined biodegradable polymer [microcrystalline-cellulose powder, ashless cellulose filters or poly(β -hydroxybutyrate)]. If possible, the physical form and size of the reference material should be comparable to that of the test material.

5.2.2 Validity of results

The test is considered valid if:

a) the degree of biodegradation of the reference material is more than 60 % at the plateau phase or at least after six months;

and

b) the BOD (biochemical oxygen demand) values of, or amount of carbon dioxide evolved from, the three blanks F_B are within 20 % of the mean at the plateau phase or at the end of the test.

5.2.3 Requirements regarding constituents

The ultimate aerobic biodegradability shall be determined for the whole material or for each organic constituent.

Organic constituents which are present at concentrations of less than 1 % do not need to demonstrate biodegradability. However, the sum of such constituents shall not exceed 5 %.

Carbon black is an inert solid. Therefore, it is not considered as an organic constituent and shall not be accounted in the calculation of the degree of biodegradation.

5.3 Ecotoxicity

5.3.1 Rationale

Ecotoxicity tests are performed in order to investigate possible adverse effects caused by the mulch film and residues as intermediates (degradation products) resulting from the degradation of mulch film in soil at the end of the intended service life.