



SLOVENSKI STANDARD

oSIST prEN 18109:2024

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Polimerni materiali - Izdelki iz polimernih materialov za kmetijstvo - Smernice za namestitvev, uporabo, odstranjevanje, sortiranje, zbiranje, pripravo za recikliranje in za načrtovanje za recikliranje

Plastics - Agricultural plastic products - Installation, use, removal, sorting, collection, preparation for recycling and design for recycling guidelines

Kunststoffe - Landwirtschaftliche Kunststoffzeugnisse - Installation, Verwendung, Abbau, Sortierung, Sammlung, Aufbereitung für das Recycling und Richtlinien für recyclinggerechte Gestaltung

Plastiques - Produits pour l'agriculture en matières plastiques - Installation, utilisation, dépose, tri, collecte, préparation au recyclage et lignes directrices pour la conception en vue du recyclage

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65.060.01	Kmetijski stroji in oprema na splošno	Agricultural machines and equipment in general
83.080.01	Polimerni materiali na splošno	Plastics in general

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ICS 13.030.50; 65.060.01; 83.080.01

English Version

**Plastics - Agricultural plastic products - Installation, use,
removal, sorting, collection, preparation for recycling and
design for recycling guidelines**

Plastiques - Landwirtschaftliche Kunststoffzeugnisse
- Installation, Verwendung, Abbau, Sortierung,
Sammlung, Aufbereitung für das Recycling und
Richtlinien für recyclinggerechte Gestaltung

Kunststoffe - Landwirtschaftliche
Kunststoffzeugnisse - Installation, Verwendung,
Abbau, Sortierung, Sammlung, Aufbereitung für das
Recycling und Richtlinien für recyclinggerechte
Gestaltung

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 249.

If this draft becomes a European Standard, CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document has been prepared by Technical Committee CEN/TC 249 “Plastics”, the secretariat of which is held by SIS.

This document is currently submitted to the CEN Enquiry.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

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Introduction

In recent years, the use of plastic products in agriculture has become a subject of concern due to its impact on the environment. To address this issue, there is a growing need for a European standard that sets guidelines in agricultural practices.

The European standardization for agricultural products aims to promote sustainable practices, reduce plastic waste, and protect the environment. It emphasizes the importance of reducing plastic waste, improving recycling and reuse methods. Also, it takes into account the entire life cycle of plastic products, from production to end of use, and encourages the adoption of practices that contribute to a circular economy, primarily recycling.

One of the key aspects is to encourage farmers and producers to opt for the implementation of collection and recycling systems specifically designed for agricultural plastic waste, as well as the use of biodegradable or compostable plastic materials.

The European standardization emphasizes the importance of proper waste management and disposal. It encourages the establishment of collection points and recycling facilities for agricultural plastic waste, ensuring that it is processed and recycled in an environmentally responsible manner. Additionally, it promotes awareness and education among farmers and producers regarding the proper handling and disposal of plastic products.

Furthermore, the European standardization encourages research and innovation in the field of sustainable materials. It calls for the development of new technologies and materials that are recyclable, reusable, biodegradable in soil or in composting and safe for agricultural use. This includes exploring options such as bio-based materials made from renewable resources or utilizing natural materials that have minimal impact on the environment.

By implementing these guidelines, farmers and producers will contribute to a more sustainable agricultural industry that balances the need for plastic products with the preservation of our natural resources.

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prEN 18109:2024 (E)**1 Scope**

This document specifies the integrated management of agricultural plastic products with agronomic performance.

This document gives guidance and requirements for their installation, use, removal, sorting, collection and preparation for recycling as well as general guidelines for design for recycling.

NOTE 1 prEN 132061¹, prEN 132071², prEN 136551³, prEN 149321⁴ and prEN 17098-11⁵ include a specific clause dedicated to design for recycling.

NOTE 2 Design for recycling for products not covered by a standard is detailed in this document.

This document first aims professional users and can be used also for domestic purposes.

This document applies to:

- covering films that comply with EN 13206:2017+A1:2020 or with specifications laid out by the film manufacturer/supplier, used for covering greenhouses, small tunnels or livestock buildings, as well as to direct crop covers used for semi-forcing plants and seed;
- silage films for horizontal silos that comply with EN 13207 or with specifications laid out by the film manufacturer/supplier;
- sheaths for horizontal silos (forage crop and grain storage) that comply with EN 13207 or with specifications laid out by the sheath manufacturer/supplier;
- stretch films for wrapping bales that comply with EN 14932 or with specifications laid out by the film manufacturer/supplier;
- thermoplastic mulching films that comply with EN 13655 or with specifications laid out by the film manufacturer/supplier;
- barrier films for agricultural and horticultural soil disinfection by fumigation comply with EN 17098-1;
- nets and twines for catling and horticulture that comply with the specifications laid out by EN ISO 4167 or by the manufacturer/supplier;
- flexible ducts, semi-rigid and rigid pipes and fittings for irrigation that comply with ISO 8779, EN ISO 9261, ISO 13460-1, ISO 16438, EN 14267, EN 12324-2, EN 13635, EN 13997, EN 17176-2:2019+A1:2022 or with specifications laid out by the manufacturer/supplier;
- fabrics and non-woven nets and sheets for catling and horticulture that comply with ISO 9073 series or with specifications laid out by the manufacturer/supplier.

This document does not cover construction, packaging and food-contact products.

NOTE 3 For products non-suitable for recycling in the context of this document, specific procedures apply.

¹ Under preparation.

² Under preparation.

³ Under preparation.

⁴ Under preparation.

⁵ Under preparation.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

EN 10244-2, *Steel wire and wire products — Non-ferrous metallic coatings on steel wire — Part 2: Zinc or zinc alloy coatings*

EN 12324-2, *Irrigation techniques — Reel machine systems — Part 2: Specifications of polyethylene tubes for reel machines*

EN 13031-1, *Greenhouses — Design and construction — Part 1: Commercial production greenhouses*

EN 13206:2017+A1:2020, *Plastics — Thermoplastic covering films for use in agriculture and horticulture*

EN 13207, *Plastics - Thermoplastic silage films and tubes for use in agriculture*

EN 13432, *Packaging — Requirements for packaging recoverable through composting and biodegradation — Test scheme and evaluation criteria for the final acceptance of packaging*

EN 13635, *Irrigation techniques — Localised irrigation systems — Terminology and data to be supplied by the manufacturer*

EN 13655, *Plastics — Thermoplastic mulch films recoverable after use, for use in agriculture and horticulture*

EN 13997, *Irrigation techniques — Connection and control accessories for use in irrigation systems — Technical characteristics and testing*

EN 14267, *Irrigation techniques — Irrigation hydrants*

EN 14932, *Plastics — Thermoplastic stretch films for wrapping silage bales*

EN 15343, *Plastics — Recycled Plastics — Plastics recycling traceability and assessment of conformity and recycled content*

EN 15344, *Plastics — Recycled plastics — Characterization of Polyethylene (PE) recyclates*

EN 15345, *Plastics — Recycled Plastics — Characterisation of Polypropylene (PP) recyclates*

EN 15347-1,⁶ *Plastics — Sorted plastics wastes — Part 1: General characterization*

EN 15347-2,⁷ *Plastics — Sorted plastics wastes — Part 2: Quality grades of sorted Polyethylene (PE) wastes and specific test methods*

EN 15347-3,⁸ *Plastics — Sorted plastics wastes — Part 3: Quality grades of sorted Polypropylene (PP) wastes and specific test methods*

⁶ Under preparation.

⁷ Under preparation.

⁸ Under preparation.

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EN 17098-1, *Plastics — Barrier films for agricultural and horticultural soil disinfection by fumigation — Part 1: Specifications for barrier films*

EN 17176-2:2019+A1:2022, *Plastics piping systems for water supply and for buried and above ground drainage, sewerage and irrigation under pressure — Oriented unplasticized poly(vinyl chloride) (PVC-O) — Part 2: Pipes*

EN 17615, *Plastics — Environmental Aspects — Vocabulary*

EN ISO 472:2013 *Plastics — Vocabulary (ISO 472:2013)*

EN ISO 4167, *Polyolefin agricultural twines (ISO 4167)*

EN ISO 1133-1, *Plastics — Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics — Part 1: Standard method (ISO 1133-1)*

EN ISO 9261, *Agricultural irrigation equipment — Emitters and emitting pipe — Specification and test methods (ISO 9261)*

EN ISO 11357-3, *Plastics — Differential scanning calorimetry (DSC) — Part 3: Determination of temperature and enthalpy of melting and crystallization (ISO 11357-3)*

ISO 8779, *Plastics piping systems — Polyethylene (PE) pipes for irrigation — Specifications*

ISO 9092, *Nonwovens — Vocabulary*

ISO 13460-1, *Agricultural irrigation equipment — Plastics saddles — Part 1: Polyethylene pressure pipes*

ISO 15270, *Plastics — Guidelines for the recovery and recycling of plastics waste*

ISO 16348, *Metallic and other inorganic coatings — Definitions and conventions concerning appearance*

3 Terms, definitions and abbreviated terms

3.1 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 472, EN 17615, ISO 9092 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at <https://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1.1

conventional useful life

useful life defined by the contract between the manufacturer/supplier and the customer or, by default, the minimum useful life of the product

Note 1 to entry: It is expressed in months or seasons for greenhouse covering films.

EXAMPLE Products include e.g. film, sheath, net, twine, canvas, nonwoven, pipe, etc.

3.1.2**actual useful life**

time interval defined as starting on the fitting date, or installation date, of a product until its removal or early failure

Note 1 to entry: It is expressed in months or seasons for greenhouse covering films.

EXAMPLE Products include e.g. film, sheath, net, twine, canvas, nonwoven, pipe, etc.

3.1.3**use ratio**

ratio of the *actual useful life* (3.1.2) of a product to its *conventional useful life* (3.1.1)

Note 1 to entry: It is expressed as a percentage, %.

EXAMPLE Products include e.g. film, sheath, net, twine, canvas, nonwoven, pipe, etc.

3.1.4**remaining use potential**

difference between the *conventional useful life* (3.1.1) of a product and its *actual useful life* (3.1.2), determined over the lifespan of the product

Note 1 to entry: It is expressed in months or seasons for greenhouse covering films.

EXAMPLE Products include e.g. film, sheath, net, twine, canvas, nonwoven, pipe, etc.

3.1.5**soilage****S**

quantity of foreign material found in a used product

Note 1 to entry: It is expressed as a percentage, %.

3.1.6**soilage rate****SR**

proportion of foreign material found in a used product calculated relatively to the mass of used product

Note 1 to entry: The formula can be found in 4.2.3.

Note 2 to entry: Soilage rate and coefficient can be transposed one into another, using the following mathematical formulae.

3.1.7**dry soilage rate**

proportion of foreign material found in a used product calculated relatively to the mass of used product, excluding water content

Note 1 to entry: The formula can be found in 4.2.3.

3.1.8**practical soilage rate**

proportion of foreign material found in a used product calculated relatively to the mass of used product

Note 1 to entry: The formula can be found in 4.2.3.

prEN 18109:2024 (E)**3.1.9****soilage coefficient****SC**

proportion of foreign material found in a used product calculated relatively to the original product mass, obtained by a transposition formula from the *soilage rate* (3.1.6)

Note 1 to entry: The formula can be found in 4.2.3.

3.1.10**reprocessor**

natural or legal person applying a physical treatment to a collected used plastic modifying its shape or physical properties

EXAMPLE: grinding, shredding-washing etc

3.1.11**recycler**

natural or legal person applying a physical treatment to a collected used plastic that transform it in a new raw material directly usable in a production process

3.1.12**collection operator**

natural or legal person ensuring by himself or via a contractor the systematic collection of used plastic that transform it in a new raw material directly usable in a production process

3.1.13**recyclability**

ability of a product, including the related accessories, to be sorted and recycled in practice and at scale in the current recycling technology and infrastructure, and deliver recyclates of suitable quality to be integrated into new products, respecting product standards and regulations in force

Note 1 to entry: The adjective of “recyclability” is “recyclable”.

[SOURCE: M/584 COMMISSION IMPLEMENTING DECISION of 1.8.2022 on a standardisation request to the European Committee for Standardisation and the European Committee for Electrotechnical Standardisation as regards plastics recycling and recycled plastics - modified]

3.1.14**design for recycling****DFR**

design of product, including the related accessories, in order to ensure its *recyclability* (3.1.13) under the current practices of removal, sorting, collection and recycling systems

Note 1 to entry: The purpose with the design for recycling criteria is to be able to use the recyclates back in the same product, independent of producer of material.

3.1.15**recycling of plastics**

process of recovering plastics waste into products, materials or substances to be used again but excluding energy recovery and materials intended to be used as fuels

Note 1 to entry: Recycling can be mechanical, chemical, physical or organic.

Note 2 to entry: Recycling is also defined in Directive 2008/98/EC, Article 3 (15a).

[SOURCE: EN 17615:2022, 3.211]

3.1.16

mechanical recycling

processing of plastic waste into secondary raw materials or products without significantly changing the chemical structure of the material

Note 1 to entry: Plastics secondary raw material is a synonym of recycle.

[SOURCE: EN ISO 472:2013, 2.1697, modified — Note 1 to entry changed; “plastics waste” changed to read “plastic waste”.]

3.1.17

chemical recycling

conversion of polymers into chemical substances by changing the chemical structure of plastic waste through processes such as cracking, pyrolysis, gasification or depolymerization excluding energy recovery and the production of materials that are to be used as fuels or for backfilling operations

Note 1 to entry: “Feedstock recycling” is widely used as a synonym for “chemical recycling”.

[SOURCE: EN 17615:2022, 3.53]

3.2 Abbreviated terms

For the purposes of this document, abbreviated terms related to recyclates given in EN ISO 1043-1 and the following apply.

DFR	Design for recycling
EOR	End of row
EPR	Extended Producer Responsibility
HWD	Heavy wall driplines
NCS	National collection scheme
OTR	Over the row
PAR	Photosynthetically active radiation
TWD	Thin wall driplines

4 Plastic products for agriculture: design for recycling, manufacture, use, removal, collection and preparation for recycling

4.1 Main characteristics of plastic products for agricultural and horticultural use

Plastics products used for agricultural or horticultural purpose take advantage of their various agronomic performances obtained by the material properties (light, air, heat, moisture control, etc.).

They are usually made mono-polymeric resins with organic and/or mineral additives, with a thickness in accordance with the intended condition of use in open air.

Products shall be used according to specifications to ensure full recyclability (as over-used products may be not suitable for recycling); for example, a greenhouse film with a 3-season warranty which are used for 5 seasons.

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These characteristics make them usually especially suitable for mechanical recycling whenever the soilage and moisture content after use and sun exposure during use do not hinder excessively the polymer quality. In a similar way, chemical contamination should be avoided (as it will be released in a later phase, during collection, cleaning, extrusion or the useful life in new products).

Thermoplastic products are recyclable materials that can be re-processed in a material recovery process intended to save resources while minimizing harmful emissions into the air, water and soil, as well as their impacts on human health. As a consequence:

- all products shall be sorted after use and collected for recycling;
- all products shall contribute for the financing of their end-of-life management;
- products not complying with DFR requirements described in this document shall be submitted to a separate handling. Product manufacturers shall provide a certificate proving their compliance with the DFR requirements of this document. This compliance is shown by the mention "(DFR compliant)" along with the product's marking;
- used products not complying with the technical minimum requirements of the collection operators are considered to be not recyclable and shall be collected separately.

The following standards shall be followed:

- EN 15347-11⁹, EN 15347-21¹⁰ and EN 15347-31¹¹ provide a framework for characterizing plastic waste.
- EN 15343 provides the procedures necessary for ensuring the traceability of recycled plastics.
- EN 15344 provides data for characterizing polyethylene recyclates.
- EN 15345 provides data for characterizing polypropylene recyclates.
- ISO 15270 provides guidelines for terminology and material recovery, in particular through mechanical recycling.

4.2 Consideration of the different impacts of design, manufacture, use and collection on the end-of-life recovery of plastics for agricultural and horticultural use

4.2.1 General

The purpose of this subclause is to simplify as much as possible the reverse logistics and cleaning operations and to preserve the mechanical properties of the collected plastics.

4.2.2 The cost of reprocessing used products

4.2.2.1 General

The reprocessing of used products is split into three main steps:

- a) product cleaning;

⁹ Under preparation.

¹⁰ Under preparation.

¹¹ Under preparation.