SLOVENSKI STANDARD
oSIST prEN 15344:2024

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Polimerni materiali - Reciklirani polimerni materiali - Karakterizacija recikliranega polietilena (PE)

Plastics - Recycled plastics - Characterization of Polyethylene (PE) recyclates

Kunststoffe - Kunststoff-Rezyklate - Charakterisierung von Polyethylen(PE)-Rezyklaten

Plastiques - Plastiques recyclés - Caractérisation des recyclats de polyéthylène (PE)

Ta slovenski standard je istoveten z: **prEN 15344**

ICS:

13.030.50	Recikliranje	Recycling
83.080.20	Plastomeri	Thermoplastic materials

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English Version

Plastics - Recycled plastics - Characterization of Polyethylene (PE) recyclates

Plastiques - Plastiques recyclés - Caractérisation des recyclats de polyéthylène (PE)

Kunststoffe - Kunststoff-Rezyklate - Charakterisierung von Polyethylen(PE)-Rezyklaten

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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Recipients of this draft are invited to submit, with their comments, notification of any relevant patent rights of which they are aware and to provide supporting documentation.

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

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European foreword

This document (prEN 15344:2024) 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 will supersede EN 15344:2021.

This document includes the following significant changes with respect to EN 15344:2021:

— The scope has been clarified;

— Clause 2 “Normative references” was updated;

— Clause 3 “Terms and definitions” was updated;

— Clause 5, including Table 1 “Characterization of PE recyclates” was revised;

— Clause 6 has been clarified

— Annex A was revised (apparatus and procedures)

This document is part of a series on Plastics Recycling which is structured as follows:

— EN 15342, *Plastics — Recycled plastics — Characterization of polystyrene (PS) recyclates*;

— 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 — Characterization of Polypropylene (PP) recyclates*;

— EN 15346, *Plastics — Recycled plastics — Characterization of poly(vinyl chloride) (PVC) recyclates*;

— EN 15347, *Plastics — Sorted plastics wastes (parts 1 to 6)*;

— EN 15348, *Plastics — Recycled plastics — Characterization of poly(ethylene terephthalate) (PET) recyclates*;

— CEN/TR 15353, *Plastics — Recycled plastics — Guidelines for the development of standards for recycled plastics*.

Introduction

Recycling plastics waste is one type of material recovery process intended to save resources (virgin raw materials, water, and energy), while minimizing harmful emissions into air, water and soil as well as any impacts on human health. The environmental impact of recycling is assessed over the whole life cycle of the recycling system (from the waste generation point to the disposal of final residues). To ensure that recycling constitutes the best environmental option for treating the available waste, some prerequisites should preferably be met:

— recycling scheme being contemplated should generate lower environmental impacts than alternative recovery options;

— existing or potential market outlets should be identified that will secure a sustainable industrial recycling operation;

— collection and sorting schemes should be properly designed to deliver recyclable plastics waste fractions fitting reasonably well with the available recycling technologies and with the (changing) needs of the identified market outlets, preferably at minimum costs to society.

This document has been produced in accordance with the guidance produced by CEN on Environmental Aspects and in accordance with CEN/TR 15353.

NOTE CEN/TR 15353 considers the general environmental aspects which are specific to the recycling process.

It is often impossible to trace back each individual product at the end user stage and to check whether the product has been used correctly through its life. Consequently, products are out of industrial control for a period of time. It is possible that during this period contamination with other materials may occur that could affect the product's suitability for recycling into the intended application.

1 Scope

This document specifies the main characteristics and associated test methods for assessing of polyethylene (PE) recyclates intended for use in the production of semi-finished or finished products.

It is intended to support parties involved in the use of PE recyclates to agree on specifications for specific and generic applications.

This document does not cover the characterization of plastics wastes, which is covered by the EN 15347 series, neither traceability topics which are covered by EN 15343.

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.

ASTM D 1895, *Standard Test Methods for Apparent Density, Bulk Factor, and Pourability of Plastic Materials*

ASTM D 1921, *Standard Test Methods for Particle Size (Sieve Analysis) of Plastic Materials*

ASTM D 6980-17, *Standard Test Method for Determination of Moisture in Plastics by Loss in Weight*

CEN/TS 17627, *Plastics — Recycled plastics — Determination of solid contaminants content*

EN 12099, *Plastics piping systems — Polyethylene piping materials and components — Determination of volatile content*

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

EN 15346, *Plastics — Recycled plastics — Characterization of poly(vinyl chloride) (PVC) recyclates*

EN 15348, *Plastics — Recycled plastics — Characterization of poly(ethylene terephthalate) (PET) recyclates*

EN 17615, *Plastics — Environmental Aspects — Vocabulary*

EN ISO 60, *Plastics — Determination of apparent density of material that can be poured from a specified funnel (ISO 60)*

EN ISO 179-1, *Plastics — Determination of Charpy impact properties — Part 1: Non-instrumented impact test (ISO 179-1)*

EN ISO 306, *Plastics - Thermoplastic materials - Determination of Vicat softening temperature (VST) (ISO 306)*

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 527-2, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics (ISO 527-2)*

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

EN ISO 1043-1, *Plastics — Symbols and abbreviated terms — Part 1: Basic polymers and their special characteristics (ISO 1043-1)*

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 1183-1, *Plastics — Methods for determining the density of non-cellular plastics — Part 1: Immersion method, liquid pycnometer method and titration method (ISO 1183-1)*

EN ISO 3451-1, *Plastics — Determination of ash — Part 1: General methods (ISO 3451-1)*

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

EN ISO 11357-1, *Plastics — Differential scanning calorimetry (DSC) — Part 1: General principles (ISO 11357-1)*

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

EN ISO 17855-2, *Plastics - Polyethylene (PE) moulding and extrusion materials - Part 2: Preparation of test specimens and determination of properties (ISO 17855-2:2016)*

EN ISO/CIE 11664-4, *Colorimetry - Part 4: CIE 1976 L*a*b* colour space (ISO/CIE 11664-4)*

ISO 13468-1, *Plastics — Determination of the total luminous transmittance of transparent materials — Part 1: Single-beam instrument*

ISO 22498, *Plastics — Vinyl chloride homopolymer and copolymer resins — Particle size determination by mechanical sieving*

CEN/TR 15353, *Plastics — Recycled plastics — Guidelines for the development of standards for recycled plastics*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in EN ISO 472, EN 17615 and CEN/TR 15353 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

4 Symbols and abbreviations

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

5 Characterization of PE recyclates

A single batch is the quantity of PE recyclates that has homogeneous characteristics within the specified tolerances.

PE recyclates (see EN ISO 1043-1) may be composed of:

— polymeric matrix, consisting of polyethylene (PE content);

— other polymers, compatible with the polymeric matrix;

— fillers, pigments and other additives.

— impurities or contamination in a quantity which do not compromise the workability characteristics of PE recyclates;

The characteristics of PE recyclates, which shall be determined for every batch (see ISO 3534-2) of recyclate, are given in Table 1, and are divided into two types:

a) required characteristics, needed to define PE recyclates in general, and required for all recyclates;

b) optional characteristics needed to define PE recyclates according to customer specifications and applications.

NOTE Polyethylene plastics waste originates from different types or grades of PE containing additives to modify characteristics. Polyethylene is generally classified as PE-HD (high density polyethylene), PE-LD (low density polyethylene), PE-LLD (linear low-density polyethylene) and others of less common use. The properties and performance of recyclates derived from such wastes can depend on the type or relative proportions of blends of PE, but it is not in the scope of this document to investigate such relations.

These characteristics shall be assessed by using the test methods given in Table 1.

A certificate of analysis giving the test results for each batch of recyclate shall be provided by the supplier to the customer upon request.

Other tests may be carried out by agreement between the customer and the supplier and results reported.

The customer may require some additional information on recyclate composition from the recycler in order to facilitate the legally compliant use of the recyclate.

Table 1 — Characterization of PE recyclates

Characteristics	**Unit**	**Test methods**	**LDPE**[a]	**HDPE**[b]	**Comments**
General information					
Product name	-	-	M	M	Indicate product name and/or reference.
Visual appearance	-	Visual inspection	M	M	For example, unicolour, transparent, mixed.
Origin of material	-	-	O	O	Indicate the type of products which are composing the incoming material and the source: Agriculture, Building & Construction, Packaging – Household, Packaging - Transport & Industry, "Housewares, Leisure,

Characteristics	Unit	Test methods	LDPE[a]	HDPE[b]	Comments
					Sports etc", Others (specify).
PIR / PCR content	-	-	O	O	-
Shape	-	Visual inspection	M	M	Typical forms are pellets, flakes, regrinds, powders and agglomerates preferably specifying the maximum particle size.
Density and particle size					
Particle size distribution	g, %	EN 15346, Annex D EN 15348, Annex A ISO 22498 ASTM D 1921	-O	O	Any additional sieve may be added (e.g. sieve of 0,5 mm) may be added upon common approval with the customer through a specification.
Bulk density	g/cm^3	EN ISO 60 for LDPE EN ISO 60 for HDPE as pellet ASTM D 1895, method C, or Annex B for HDPE as flakes	O	O	Any alternative method may be used upon common approval with the customer through a specification.
Density	g/cm^3	EN ISO 1183-1 EN ISO 17855-2	M	M	-
Pellet size	g or number	Weight of 100 pellets or number of pellets in 1 g	O	O	-
Viscosity					
Melt Mass-Flow Rate (MFR)	g/ 10 min	EN ISO 1133-1 EN ISO 17855-2	M	M	In case MFR goes below 0,1 g/min, to provide I5.