



**SLOVENSKI STANDARD**  
**SIST EN 15346:2024**

**01-oktober-2024**

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**Polimerni materiali - Reciklirani polimerni materiali - Karakterizacija reciklatov polivinilklorida (PVC)**

Plastics - Recycled plastics - Characterization of poly(vinyl chloride) (PVC) recyclates

Kunststoffe - Kunststoff-Rezyklate - Charakterisierung von Polyvinylchlorid (PVC)-Rezyklaten

Plastiques - Plastiques recyclés - Caractérisation des recyclats de poly(chlorure de vinyle) (PVC)

**Ta slovenski standard je istoveten z: EN 15346:2024**

[SIST EN 15346:2024](https://standards.iteh.ai/standards/sist/8f440eaf-9e76-4534-9e25-837e4d91bd5d/sist-en-15346-2024)

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**ICS:**

13.030.50	Recikliranje	Recycling
83.080.20	Plastomeri	Thermoplastic materials

**SIST EN 15346:2024**

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EUROPEAN STANDARD

EN 15346

NORME EUROPÉENNE

EUROPÄISCHE NORM

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ICS 13.030.50; 83.080.20

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English Version

## Plastics - Recycled plastics - Characterization of poly(vinyl chloride) (PVC) recyclates

Plastiques - Plastiques recyclés - Caractérisation des recyclats de poly(chlorure de vinyle) (PVC)

Kunststoffe - Kunststoff-Rezyklate - Charakterisierung von Polyvinylchlorid (PVC)-Rezyklaten

This European Standard was approved by CEN on 3 June 2024.

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. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

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

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## European foreword

This document (EN 15346:2024) has been prepared by Technical Committee CEN/TC 249 “Plastics”, the secretariat of which is held by SIS.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by February 2025, and conflicting national standards shall be withdrawn at the latest by February 2025.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN 15346:2014.

EN 15346:2024 includes the following significant technical changes with respect to EN 15346:2014:

- The scope has been clarified;
- The introduction has been harmonized with EN 15342, EN 15344, EN 15345, EN 15348 and EN 18067;
- Clause 2 “Normative references” was updated;
- in Clause 3 “Terms and definitions” term 3.1 was removed;
- in Clause 5 Table 1 “Characterization of PVC recyclates” was revised;
- Clause 6 was clarified;
- Annex A “Typical compositions of PVC compounds” was removed;
- Annex C “Size and distribution of particles contained in micronized recycled PVC compounds by sieving” and Annex D “Size and distribution of recycled PVC crushes by sieving” were revised;
- Annex E and F: the titles were clarified.

This document is one part of series of CEN publications 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 15346:2024 (E)**

- EN 15347<sup>1</sup>, (series), *Plastics — Sorted plastics wastes*
- EN 15348, *Plastics — Recycled plastics — Characterization of poly(ethylene terephthalate) (PET) recyclates*
- EN 18067<sup>2</sup>, *Plastics — Recycled plastics — Characterization of acrylonitrile-butadiene-styrene (ABS) recyclates*
- CEN/TR 15353, *Plastics — Recycled plastics — Guidelines for the development of standards for recycled plastics*

Any feedback and questions on this document should be directed to the users' national standards body. A complete listing of these bodies can be found on the CEN website.

According to the CEN-CENELEC Internal Regulations, the national standards organisations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Türkiye and the United Kingdom.

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<sup>1</sup> Under preparation. Current stage is: prEN 15437-X:2023.

<sup>2</sup> Under preparation. Current stage is: prEN 18067:2024.

## Introduction

Recycling of plastic 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 needs to be 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.

During their life, products are temporarily out of industrial control. Consequently, at the end user stage, it is often impossible to trace back each individual product and to check whether the product has been used correctly through its life cycle.

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**EN 15346:2024 (E)****1 Scope**

This document specifies the main characteristics and associated test methods for assessing of poly(vinyl chloride) (PVC) recyclates intended for use in the production of semi-finished/finished products.

This document is intended to support parties involved in the use of PVC 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<sup>1</sup>(series), nor traceability topics which are covered by EN 15343.

This document is applicable without prejudice to any existing legislation.

**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.

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

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

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

EN ISO 179-2, *Plastics — Determination of Charpy impact properties — Part 2: instrumented impact test (ISO 179-2)*

EN ISO 182-2, *Plastics — Determination of the tendency of compounds and products based on vinyl chloride homopolymers and copolymers to evolve hydrogen chloride and any other acidic products at elevated temperatures — Part 2: pH method (ISO 182-2)*

EN ISO 182-3, *Plastics — Determination of the tendency of compounds and products based on vinyl chloride homopolymers and copolymers to evolve hydrogen chloride and any other acidic products at elevated temperatures — Part 3: Conductometric method (ISO 182-3)*

EN ISO 182-4, *Plastics — Determination of the tendency of compounds and products based on vinyl chloride homopolymers and copolymers to evolve hydrogen chloride and any other acidic products at elevated temperatures — Part 4: Potentiometric method (ISO 182-4)*



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 868, *Plastics and ebonite — Determination of indentation hardness by means of a durometer (Shore hardness) (ISO 868)*

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 1269, *Plastics — Homopolymer and copolymer resins of vinyl chloride — Determination of volatile matter (including water) (ISO 1269)*

EN ISO 3451-5, *Plastics — Determination of ash — Part 5: Poly(vinyl chloride) (ISO 3451-5)*

EN ISO 6186, *Plastics — Determination of pourability (ISO 6186)*

EN ISO 21306-2, *Plastics — Unplasticized poly(vinyl chloride) (PVC-U) moulding and extrusion materials — Part 2: preparation of test specimens and determination of properties (ISO 21306-2)*

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

ISO 182-1, *Plastics — Determination of the tendency of compounds and products based on vinyl chloride homopolymers and copolymers to evolve hydrogen chloride and any other acidic products at elevated temperatures — Part 1: Congo red method*

ISO 565, *Test sieves — Metal wire cloth, perforated metal plate and electroformed sheet — Nominal sizes of openings*

### 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 are given in EN ISO 1043-1.

NOTE In addition to the abbreviation “rPVC”, “PVC-R” or “R-PVC” or “PVC(REC)” are also used.

## 5 Characterization of PVC recyclates

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

The characteristics of PVC recyclates, which shall be met for every batch of PVC recyclate are shown in Table 1, and divided into two types:

- a) required characteristics needed to characterize PVC recyclates in general, and required for all recyclates;
- b) optional characteristics needed to characterize PVC recyclates according to customer specifications and applications.

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 recyclates shall be provided by the supplier to the customer upon request.

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

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

**Table 1 — Characterization of PVC recyclates**

Characteristic	Units	Test method	PVC-U		PVC-P		Comments
			Non micro-nized **	Micro-nized	Non micro-nized **	Micro-nized	
General information							
Product name			M	M	M	M	
Visual appearance			M	M	M	M	
Origin of material			O	O	O	O	Indicate the type of products which are composing the incoming material and the source: Agriculture, Building and Construction, Packaging - Household, Packaging - Transport and Industry, "Housewares, Leisure, Sports etc", Mixed origin, Others (specify)
Shape		Visual	M	M	M	M	e.g. micronized material, pellets, particles
Density and particle size							
Bulk density	kg/m <sup>3</sup>	Annex A or EN ISO 60	O	M	O	M	

Characteristic	Units	Test method	PVC-U		PVC-P		Comments
			Non micro-nized **	Micro-nized	Non micro-nized **	Micro-nized	
Density	kg/m <sup>3</sup>	EN ISO 1183-1 Method A	0	0	0	0	
Dry flow rate	s	EN ISO 6186	-	0	0	0	Recommended for micronized materials or small particle size recyclates
Particle size	g, %	Annex C <sup>a</sup> Annex D <sup>b</sup>	0	M	0	M	An alternative method agreed by both parties may also be used (for example using a laser particle size equipment)
Particle size distribution	g, %	Annex C <sup>a</sup> Annex D <sup>b</sup>	0	0	0	0	An alternative method agreed by both parties may also be used (for example using a laser particle size equipment)
Colour							
Colour		L*a*b* value according to EN ISO/CIE 11664-4 if a specific colour is required	0	0	0	0	
Composition							
Ash content	%	EN ISO 3451-5 Method A	0	0	0	0	Linked with filler and mineral content
Impurities	%	Annex B	-	0	0	0	An alternative method agreed by both parties may also be used (for example visual evaluation after extrusion on strips)
Water/volatiles							
Residual humidity	%	EN 12099 <sup>c</sup>	0	0	0	0	Weight loss, 105 °C Any alternative method (e.g. halogen heated oven...) may be used upon common approval with the customer through a specification
Volatile content	%	EN ISO 1269	0	0	0	0	Linked to moisture content
Mechanical properties							