



# SLOVENSKI STANDARD

## SIST EN 15346:2015

01-januar-2015

Nadomešča:  
SIST EN 15346:2008

---

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

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

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

**ITeH STANDARD PREVIEW**  
**(standards.iteh.ai)**

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

[SIST EN 15346:2015](#)

<https://standards.iteh.ai/catalog/standards/sist/548aea6c-068c-4d01-8c22-28860f28a397/sist-en-15346-2015>

**Ta slovenski standard je istoveten z: EN 15346:2014**

---

#### **ICS:**

13.030.50	Recikliranje	Recycling
83.080.20	Plastomeri	Thermoplastic materials

**SIST EN 15346:2015**

**en,fr,de**

**iTeh STANDARD PREVIEW**  
**(standards.iteh.ai)**

[SIST EN 15346:2015](#)

<https://standards.iteh.ai/catalog/standards/sist/548aea6c-068c-4d01-8c22-28860f28a397/sist-en-15346-2015>

EUROPEAN STANDARD

**EN 15346**

NORME EUROPÉENNE

EUROPÄISCHE NORM

November 2014

ICS 13.030.50; 83.080.20

Supersedes EN 15346:2007

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 20 September 2014.

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.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.

**SIST EN 15346:2015**

<https://standards.iteh.ai/catalog/standards/sist/548aea6c-068c-4d01-8c22-28860f28a397/sist-en-15346-2015>

EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
EUROPÄISCHES KOMITEE FÜR NORMUNG**CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels**

## Contents

	Page
Foreword.....	4
Introduction .....	5
1 Scope .....	6
2 Normative references .....	6
3 Terms and definitions .....	7
4 Characterization of PVC recyclates .....	7
5 Quality assurance .....	9
Annex A (informative) Typical compositions of PVC compounds .....	10
Annex B (normative) Determination of bulk density .....	11
B.1 General.....	11
B.2 Material .....	12
B.3 Apparatus .....	12
B.4 Preparation of test sample.....	12
B.5 Procedure .....	12
B.6 Expression of results .....	12
B.7 Test report .....	13
Annex C (normative) Determination of tetrahydrofuran insoluble impurities.....	14
C.1 General.....	14
C.2 Apparatus .....	14
C.3 Reagent.....	14
C.4 Procedure .....	15
C.5 Expression of results .....	15
C.6 Test report .....	16
Annex D (normative) Size and distribution of particles contained in micronized recycled PVC compounds by sieving.....	17
D.1 General.....	17
D.2 Reagents.....	17
D.3 Apparatus .....	17
D.4 Procedure .....	17
D.5 Number of determinations .....	18
D.6 Determination and expression of the results .....	18
D.7 Test report .....	19
Annex E (normative) Size and distribution of recycled PVC crushes by sieving .....	20
E.1 General.....	20

<b>E.2</b>	<b>Apparatus .....</b>	<b>20</b>
<b>E.3</b>	<b>Procedure .....</b>	<b>20</b>
<b>E.4</b>	<b>Number of determinations .....</b>	<b>21</b>
<b>E.5</b>	<b>Determination and expression of the results .....</b>	<b>21</b>
<b>E.6</b>	<b>Test report .....</b>	<b>22</b>
	<b>Annex F (normative) Fitness for processing of PVC recyclates by calendering .....</b>	<b>23</b>
<b>F.1</b>	<b>General .....</b>	<b>23</b>
<b>F.2</b>	<b>Apparatus .....</b>	<b>23</b>
<b>F.3</b>	<b>Procedure .....</b>	<b>23</b>
	<b>Annex G (normative) Fitness for processing of PVC recyclates by extrusion .....</b>	<b>25</b>
<b>G.1</b>	<b>General .....</b>	<b>25</b>
<b>G.2</b>	<b>Apparatus .....</b>	<b>25</b>
<b>G.3</b>	<b>Procedure .....</b>	<b>25</b>
	<b>Bibliography .....</b>	<b>26</b>

## iTeh STANDARD PREVIEW (standards.iteh.ai)

[SIST EN 15346:2015](https://standards.iteh.ai/catalog/standards/sist/548aea6c-068c-4d01-8c22-28860f28a397/sist-en-15346-2015)

<https://standards.iteh.ai/catalog/standards/sist/548aea6c-068c-4d01-8c22-28860f28a397/sist-en-15346-2015>

**EN 15346:2014 (E)****Foreword**

This document (EN 15346:2014) has been prepared by Technical Committee CEN/TC 249 "Plastics", the secretariat of which is held by NBN.

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 May 2015 and conflicting national standards shall be withdrawn at the latest by May 2015.

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

This document supersedes EN 15346:2007.

EN 15346:2014 includes the following significant technical change with respect to EN 15346:2007: revision of Annex C.

This European Standard 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 15347, *Plastics — Recycled Plastics — Characterization of plastics wastes*
- 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*

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

## Introduction

Recycling of 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 has 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 European Standard 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 might occur that could affect the product's suitability for recycling into the intended application.

<https://standards.iteh.ai/catalog/standards/sist/548aea6c-068c-4d01-8c22-28860f28a397/sist-en-15346-2015>

**EN 15346:2014 (E)****1 Scope**

This European Standard defines a method of specifying delivery conditions for poly(vinyl chloride) (PVC) recyclates.

It gives the most important characteristics and associated test methods for assessing of PVC recyclates intended for use in the production of semi-finished/finished products.

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

This European Standard does not cover the characterization of plastics wastes. See EN 15347.

This European Standard is applicable without prejudice to any existing legislation.

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

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

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)*

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 and CEN/TR 15353 and the following apply.

#### 3.1

##### **sieve retention**

percentage of the recycled test sample retained on a sieve at the end of the test

Note 1 to entry: The sieve retention is expressed in per cent (mass fraction).

#### 3.2

##### **container retention**

percentage of recycled material retained in the container at the bottom of a stack of sieves, or under a single sieve, at the end of the test compared to the mass of the sample tested

#### 3.3

##### **average particulate dimension**

single value of size, expressed to the nearest 0,001 mm, representing the dominant particle size for the whole test sample

### 4 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, given in Table 1, are divided into two types:

- required characteristics needed to characterize PVC recyclates in general, and required for all recyclates;
- 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 purchaser upon request.

NOTE Typical compositions of PVC compounds are given in Annex A.

## EN 15346:2014 (E)

The supplier shall provide the necessary information about the material composition of the recyclates, as specified by the purchaser or required by the applicable regulations.

Table 1 — Characterization of PVC recyclates

Characteristic	Units	Test method	PVC-U	PVC-P	Comments
<b>Required</b>					
Bulk density	kg/m <sup>3</sup>	Annex B	X	X	
Ash content	%	EN ISO 3451-5 Method A	X	X	Linked with filler and mineral content
Colour		Visual Inspection	X	X	e.g. natural colour, single, mixed
Hardness		EN ISO 868		X	For calendering stiffness may be evaluated instead of hardness. See Annex F.
Impurities	%	Annex C	X	X	An alternative method agreed by both parties may also be used.
Particle size and distribution	g, %	Annex D <sup>a</sup> Annex E <sup>b</sup>	X	X	Size distribution is needed for materials with a low particle size.
Shape		Visual	X	X	e.g. micronized material, pellets, particles
<b>Optional</b>					
Dry flow rate	s	EN ISO 6186	O	O	Recommended for micronized materials or small particle size recyclates
Density	kg/m <sup>3</sup>	EN ISO 1183-1 Method A	O	O	
Fitness of processing of PVC recyclates — by calendering — by extrusion		Annex F Annex G	O O	O O	
Residual humidity	%	EN 12099 <sup>c</sup>	O	O	Weight loss, 105 °C
Tensile stress at yield	MPa	EN ISO 527-1 EN ISO 527-2	O	O	
Tensile strain at break	%	EN ISO 527-1 EN ISO 527-2	O	O	Elongation
Thermal stability	min	ISO 182-1 EN ISO 182-2 EN ISO 182-3 EN ISO 182-4	O	O	Linked to stabilizer content Specify which is used.
Vicat softening temperature	°C	EN ISO 306 Method B50	O		

Volatile content	%	EN ISO 1269	O	O	Linked to moisture content
<b>Key</b>					
X required characteristics to be quantified					
O optional characteristics to be quantified					
Other tests may be carried out by an agreement between the purchaser and the supplier. The test results should be reported.					
a Only applicable for micronized recycled PVC compounds.					
b Only applicable for recycled PVC crushes.					
c Although the scope of EN 12099 is limited, it is considered relevant.					

## 5 Quality assurance

In order that the purchaser of the recyclate can have confidence in the quality of the product, the supplier shall maintain records of the quality control carried out, including incoming materials, processes and finished products.

NOTE A quality management system certified to EN ISO 9001 may be a suitable guarantee of consistent recyclate quality but not the recycled content.

The specification and the standard deviation or range of values within and between batches of material shall be agreed between the supplier and the purchaser.

Where a statement of recycled content, or the previous history of the material, is requested, documentary evidence shall be provided. These records should be available to the purchaser on request.

Where a recyclate has been produced via a melt process, the supplier may choose to state the level of filtration applied during that process. This will determine the maximum size of any non-melting contaminants present in the recyclate. The statement of filtration level shall include details of the filter. Recyclates which have not passed through a melt process cannot be quantified in the same way, and the supplier may state this.