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**Polimerni materiali - Reciklirani polimerni materiali - Karakterizacija recikliranega polipropilena (PP)**

Plastics - Recycled Plastics - Characterisation of Polypropylene (PP) recyclates

Kunststoffe - Kunststoff-Rezyklate - Charakterisierung von Polypropylen (PP)-Rezyklaten

Plastiques - Plastiques recyclés - Caractérisation des recyclats de polypropylene (PP)

**Ta slovenski standard je istoveten z: EN 15345:2007**

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**ICS:**

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English Version

## Plastics - Recycled Plastics - Characterisation of Polypropylene (PP) recyclates

Plastiques - Plastiques recyclés - Caractérisation des  
recyclats de polypropylène (PP)

Kunststoffe - Kunststoff-Rezyklate - Charakterisierung von  
Polypropylen (PP)-Rezyklaten

This European Standard was approved by CEN on 25 October 2007.

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 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 Management Centre has the same status as the official versions.

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EUROPEAN COMMITTEE FOR STANDARDIZATION  
COMITÉ EUROPÉEN DE NORMALISATION  
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## Foreword

This document (EN 15345:2007) has been prepared by Technical Committee CEN/TC 249 "Plastics recycle characterisation of PP", 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of an identical text or by endorsement, at the latest by June 2008, and conflicting national standards shall be withdrawn at the latest by June 2008.

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 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—Characterisation of Polyethylene (PE) recyclates
- EN 15345 Plastics—Recycled Plastics—Characterisation of Polypropylene (PP) recyclates
- EN 15346 Plastics—Recycled plastics—Characterisation of poly(vinyl chloride) (PVC) recyclates
- EN 15347 Plastics — Recycled Plastics — Characterisation 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, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Slovakia, Slovenia, Spain, Sweden, Switzerland 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 minimising 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 standard has been produced in accordance with the guidance produced by CEN on Environmental Aspects and in accordance with CEN/TR 15353, Plastics — Recycled plastics — Guidelines for the development of standards for recycled plastics.

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 European Standard defines a method of specifying delivery conditions for Polypropylene (PP) recyclates.

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

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

This standard does not cover the characterisation of plastics wastes. See EN 15347.

This standard is applicable without prejudice to any existing legislation.

## 2 Normative references

The following referenced documents are indispensable for the application 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 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 ISO 1133, *Plastics — Determination of the melt mass-flow rate (MFR) and the melt volume-flow rate (MVR) of thermoplastics (ISO 1133:2005)* [SIST EN 15345:2008](https://standards.iteh.ai/catalog/standards/sist/fa98afaf-d85b-4a5d-a0b3-6a7046307555/EN-ISO-1133-2005)

EN ISO 178, *Plastics — Determination of flexural properties (ISO 178:2001)*

EN ISO 179-1, *Plastics — Determination of Charpy impact properties — Part 1: Non-instrumented impact test (ISO 179-1:2000)*

EN ISO 179-2, *Plastics — Determination of Charpy impact properties — Part 2: Instrumented impact test (ISO 179-2:1997)*

EN ISO 180, *Plastics — Determination of Izod impact strength (ISO 180:2000)*

EN ISO 472:2001, *Plastics — Vocabulary (ISO 472:1999)*

EN ISO 527-1, *Plastics — Determination of tensile properties — Part 1: General principles (ISO 527-1:1993 including Corr 1:1994)*

EN ISO 527-2, *Plastics — Determination of tensile properties — Part 2: Test conditions for moulding and extrusion plastics (ISO 527-2:1993 including Corr 1:1994)*

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 1183-1:2004)*

EN ISO 3451-1, *Plastics — Determination of ash — Part 1: General methods (ISO 3451-1:1997)*

CEN/TR 15353:2007 *Plastics — Recycled Plastics — Guidelines for the development of standards relating to recycled plastics*

### 3 Terms, definitions and abbreviated terms

For the purposes of this European Standard, the terms and definitions given in EN ISO 472:2001 and CEN/TR 15353:2007 apply.

### 4 Characteristics of PP recyclates

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

The characteristics of PP recyclates, given in Table 1, are divided into two types:

- Required characteristics needed to characterize PP recyclates in general and required for specified recyclates.
- Optional characteristics needed to characterize PP recyclates according to customer specifications and applications.

NOTE Polypropylene, or polypropylene-containing plastics wastes may contain a variety of propylene polymers such as homo- and co-polymers, isotactic, syndiotactic and atactic, and be with or without fillers, fire retardants etc. The performance of recyclates derived from such wastes will depend on the relative proportions of these components. In order to be described as recycled polypropylene, the recyclate must contain polypropylene as the most important polymeric component.

These characteristics shall be assessed by using the test methods given in Table 1. Where possible, the supplier should provide information on the original application of the material.

A Certificate of Analysis, providing the test results for each batch of recyclate shall be provided by the supplier to the purchaser on request.

To secure the legal use of the recyclate, the supplier shall provide the necessary information about the material composition of the recyclates, as specified by the purchaser.



Table 1 – Characterisation of PP recyclates

Characteristic	Unit	Test Method	Comment
<b>Required</b>			
Colour		Visual inspection	
Density	Kg/m <sup>3</sup>	EN ISO 1183-1 Method A	
Impact Strength	KJ/m <sup>2</sup>	EN ISO 179-1, EN ISO 179-2 or EN ISO 180	
Melt Flow Rate	g/10min	EN ISO 1133 Condition M	
Shape		Visual inspection <sup>a</sup>	
<b>Optional</b>			
Ash Content	%	EN ISO 3451-1	
Bulk Density	Kg/m <sup>3</sup>	See Annex A	
Extraneous Polymers	%	Thermal/Infra-red Analyses	
Flexural Properties	MPa	EN ISO 178	
Filtration Level		Mesh Size	Provide information on mesh size.
Recycled Content	%	EN 15343	
Tensile stress at yield	MPa	EN ISO 527-1 EN ISO 527-2	
Tensile strain at break	%	EN ISO 527-1 EN ISO 527-2	
Volatile Content	%	EN 12099 <sup>b</sup> or other	
<sup>a</sup> For example, ground, micronised, pellets, flakes. <sup>b</sup> Although the scope of EN 12099 is limited, it is considered relevant. Other tests may be carried out by agreement between the purchaser and the supplier and the results reported.			

## 5 Quality Assurance

In order that the purchaser of the recyclate may 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. A quality management system certified to EN ISO 9001 may be a suitable guarantee of consistent recyclate quality.

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, where there is no analytical method available to supply such information. These records should be available to the purchaser on request.