

---

---

Plastics – Recycled plastics – Characterization of poly(ethylene terephthalate)  
(PET) recyclates

**iTeh Standards**  
**(<https://standards.iteh.ai>)**  
**Document Preview**

[SIST EN 15348:2008](https://standards.iteh.ai/catalog/standards/sist/248849bd-9a40-4f0d-86a9-dd503f638f5d/sist-en-15348-2008)

<https://standards.iteh.ai/catalog/standards/sist/248849bd-9a40-4f0d-86a9-dd503f638f5d/sist-en-15348-2008>



September 2005

---

ICS

English Version

## Plastics - Recycled plastics - Characterization of poly(ethylene terephthalate) (PET) recyclates

Plastiques - Plastiques recyclés - Caractérisation des recyclats de poly(téréphtalate d'éthylène) (PET)

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.

This draft European Standard was established by CEN 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 Management Centre has the same status as the official versions.

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

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.

**Warning** : This document is not a European Standard. It is distributed for review and comments. It is subject to change without notice and shall not be referred to as a European Standard.

<https://standards.iteh.ai>  
**SIST EN 15348:2008**

<https://standards.iteh.ai/catalog/standards/sist/248849bd-9a40-4f0d-86a9-dd503f638f5d/sist-en-15348-2008>



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

**Management Centre: rue de Stassart, 36 B-1050 Brussels**

## Contents

Page

Foreword.....	4
Introduction .....	5
1 Scope .....	6
2 Normative references .....	6
3 Terms and definitions .....	6
4 Characterisation of PET recyclates .....	7
5 Quality assurance .....	8
<b>Annex A (normative) Method for the determination of size and distribution of PET-R flakes by sieving.....</b>	<b>9</b>
A.1 Scope .....	9
A.2 Terms and definitions .....	9
A.2.1 Sieve retention .....	9
A.2.2 Container retention.....	9
A.2.3 Average particulate dimension .....	9
A.3 Principles.....	9
A.4 Apparatus .....	9
A.4.1 Weighing scale:.....	9
A.4.2 Sieve: .....	9
A.4.3 Mechanical sieve shaker.....	10
A.5 Procedure .....	10
A.6 Number of determinations .....	10
A.7 Determination and expression of the results .....	10
A.8 Test report .....	11
<b>Annex B (normative) Method for the determination of the melt mass-flow rate (MFR) of PET.....</b>	<b>12</b>
B.1 Scope .....	12
B.2 Summary of method .....	12
B.3 Test equipment .....	12
B.4 Safety precautions.....	13
B.5 Measurement.....	13
B.6 Results .....	14
<b>Annex C (normative) Gravimetric method for the determination of residual humidity (water content).....</b>	<b>15</b>
C.1 General.....	15
C.2 Principle .....	15
C.3 Apparatus .....	15
C.4 Caution.....	15
C.5 Procedure .....	15
C.6 Expression of results .....	16
C.7 Test report .....	16
<b>Annex D (normative) Rapid method for the determination of residual impurities .....</b>	<b>17</b>
D.1 General.....	17
D.2 Principle .....	17
D.3 Apparatus .....	17
D.4 Procedure .....	18
D.5 Test report .....	19
<b>Annex E (informative) Potentiometric method for the determination of the residual alkalinity.....</b>	<b>20</b>

E.1	General .....	20
E.2	Principle.....	20
E.3	Apparatus .....	20
E.4	Reagents.....	20
E.5	Procedure .....	20
E.6	Expression of results .....	20
E.7	Test report.....	21
<b>Annex F</b>	<b>(informative) Method for the determination of infusible impurities by filtration .....</b>	<b>22</b>
F.1	General .....	22
F.2	Principle.....	22
F.3	Apparatus .....	22
F.4	Procedure .....	22
F.5	Expression of results .....	22
F.6	Test report.....	23
<b>Annex ZA</b>	<b>(normative) Normative references to international publications with their relevant European publications .....</b>	<b>24</b>
<b>Bibliography</b>	.....	<b>25</b>

iTeh Standards  
 (<https://standards.iteh.ai>)  
 Document Preview

[SIST EN 15348:2008](https://standards.iteh.ai/catalog/standards/sist/248849bd-9a40-4f0d-86a9-dd503f638f5d/sist-en-15348-2008)

<https://standards.iteh.ai/catalog/standards/sist/248849bd-9a40-4f0d-86a9-dd503f638f5d/sist-en-15348-2008>

## Foreword

This document (prEN 15348:2005) has been prepared by Technical Committee CEN/TC 249 "Plastics", the secretariat of which is held by IBN.

This document is currently submitted to the CEN Enquiry.

This standard is one part of series of CEN publications on Plastics Recycling which is structured as follows:

- prEN 15343 Plastics recycling traceability and assessment of conformity
- pr(wi00249540) Sampling procedures for testing plastics waste and recyclates
- pr(wi00249541) Standard practice for preparation of recycled plastics prior to testing
- pr(wi00249542) Standard practice for separation of solid contaminants in polymers
- pr(wi00249543) Method to separate and identify contaminants in recycled plastics
- prEN 15344 Plastics recyclate characterisation of PE
- prEN 15345 Plastics recyclate characterisation of PP
- prEN 15346 Plastics recyclate characterisation of PVC
- prEN 15342 Plastics recyclate characterisation of PS
- prEN 15347 Characterisation of waste plastics
- prCEN/TR 15353 Guidelines for the development of standards relating to recycled plastics

[SIST EN 15348:2008](https://standards.iteh.ai/catalog/standards/sist/248849bd-9a40-4f0d-86a9-dd503f638f5d/sist-en-15348-2008)

<https://standards.iteh.ai/catalog/standards/sist/248849bd-9a40-4f0d-86a9-dd503f638f5d/sist-en-15348-2008>

## Introduction

Recycling of plastics waste is a material recovery process to save resources (virgin raw materials, water, energy), while minimising harmful emissions into air, water and soil as well as their 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:

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

# iTeh Standards (<https://standards.iteh.ai>) Document Preview

[SIST EN 15348:2008](https://standards.iteh.ai/catalog/standards/sist/248849bd-9a40-4f0d-86a9-dd503f638f5d/sist-en-15348-2008)

<https://standards.iteh.ai/catalog/standards/sist/248849bd-9a40-4f0d-86a9-dd503f638f5d/sist-en-15348-2008>

## 1 Scope

This European Standard gives guidelines for the characterisation of poly(ethylene terephthalate) (PET) recyclates.

It gives the most important characteristics and associated test methods for assessing of PET recyclates intended to be used for the production of semi-finished/finished products. It is intended for use by the supplier and purchaser of such materials, to assist them in agreeing specifications.

A single batch of R-PET (recycled PET) is presumed to be a homogenous and representative sample of the material to be characterised.

This standard has been produced in accordance with the guidance produced by CEN on Environmental Aspects and in accordance with WI 249551 - "Guidelines for the development of standards relating to recycled plastics.

## 2 Normative references

This European Standard incorporates by dated or undated reference, provisions from other publications. These normative references are cited at the appropriate places in the text and the publications are listed hereafter. For dated references, subsequent amendments to or revisions of any of these publications apply to this European Standard only when incorporated in it by amendment or revision. For undated references the latest edition of the publication referred to applies (including amendments).

ISO 565:1990, *Test sieves – Metal wire cloth, perforated metal plate and electroformed sheet – Openings*

ISO 1628-5, *Plastics - Determination of the viscosity of polymers in dilute solution using capillary viscometers - Part 5: Thermoplastic polyesters (TP) homopolymers and copolymers*

ISO 3534-2: 1993, *Statistic-Vocabulary and symbols - Part 2: Statistical quality control*

EN ISO 9001:2000, *Quality management systems - Requirements*

prCEN/TR 15353, *Guidelines for the development of standards relating to recycled plastics*<sup>1)</sup>

WI 249537, *Classification and marking of plastics recyclates*<sup>1)</sup>

prEN 15343, *Plastics recycling traceability and assessment of conformity*<sup>1)</sup>

WI 249540, *Recycled Plastics – Sampling Procedures for testing plastics wastes and recyclates*<sup>1)</sup>

WI 249541, *Recycled Plastics – Preparation of recycled plastics prior to testing*<sup>1)</sup>

WI 249542, *Recycled Plastics – Standard method for separation of solid contaminants*<sup>1)</sup>

WI 249543, *Recycled Plastics – Guide for methods to identify contaminants in recycled plastics*<sup>1)</sup>

## 3 Terms and definitions

For the purposes of this European Standard, the terms, definitions and abbreviated terms given in EN ISO 472 and those prepared under prCEN/TR 15353 Guidelines for the development of standards relating to recycled plastics.

---

1) In preparation



### 3.1

#### **Poly(ethylene terephthalate) recyclate, PET (R)**

Poly(ethylene terephthalate) material resulting from the recycling of Poly(ethylene terephthalate)

## 4 Characterisation of PET recyclates

The characteristics of PET recyclates, which shall be met for every batch (see ISO 3534-2) of PET (R) are shown in table 1, and are divided into two types:

- basic characteristics needed to characterise PET recyclates in general and required for all recyclates.
- optional characteristics needed to characterise PET recyclates according to customer specifications and applications.

These characteristics shall be assessed by using the test methods given in Table 1 and detailed below. A Certificate of Analysis, giving the test results for each batch of recyclate shall be provided by the supplier to the purchaser on request.

Samples shall be taken in accordance with the procedures laid out in pr EN wi00249540 and pr EN wi00249541 Recycled Plastics – Preparation of recycled plastics prior to testing.

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

**WARNING: It is most important for safety reasons that personal protective clothing is used when applying solvents to the test specimen. The use of solvents in regard to application of this standard may be further controlled under National and/or regional legislation.**

(<https://standards.iteh.ai>)  
Document Preview

[SIST EN 15348:2008](#)

<https://standards.iteh.ai/catalog/standards/sist/248849bd-9a40-4f0d-86a9-dd503f638f5d/sist-en-15348-2008>

Table 1 - Characterization of PET recyclates

Characteristics	Unit	Test Method	Comments
<b>Required</b>			
Shape		Visual	X - Flakes, pellets
Maximum particle size determination	mm		X – Given by the size of the screen of the grinder
Fine particle content	%	Annex A	X – Screening method
Colour		Visual	X
Determination Melt Mass-Flow Rate (MFR)		Annex B	X
Water content	%	Annex C	X
PVC content <sup>a</sup>	ppm	Annex D	X
Polyolefin content <sup>a</sup>	%	Annex D	X
Other residual content <sup>a</sup>	ppm	Annex D	X
<b>Optional</b>			
Intrinsic Viscosity (I.V.)	dl/g	ISO 1628-5	O
Alkalinity	pH	Annex E	O – Only for flakes
Filterability	100 bar/h/cm <sup>2</sup>	Annex F	O
Colour	L,a,b	Colormeter	O – Injection molded disks from Flakes, pellets
X : basic characteristics to be quantified O : optional characteristics to be quantified			
a Suitable methods to identify contamination may also be found in prEN 249543			
The parties may agree to other additional tests not specified in this standard.			

## 5 Quality assurance

In order that the purchaser of the recyclate may have confidence in the quality of the product, the supplier should maintain records of the quality control carried out, including incoming materials, processes and finished products. A Quality Management System certified to ISO 9001:2000 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 should be provided, as there is currently no analytical method available to supply such information. These records should be available to the purchaser on request.

NOTE prEN 15343 describes a Qualified Recycling Process and gives details of traceability and the assessment of recycled content. .