



SLOVENSKI STANDARD
oSIST prEN 18120-10:2024
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**Embalaža - Načrtovanje, ki omogoča recikliranje plastične embalaže - 10. del:
Postopek za ocenjevanje možnosti recikliranja plastične embalaže - Protokoli za
plastenke iz polietilen tereftalata (PET-plastenke)**

Packaging - Design for recycling for plastic packaging - Part 10: Recyclability evaluation process for plastic packaging - Protocols for PET bottles

Verpackung - Recyclingorientierte Gestaltung von Kunststoffverpackungsprodukten - Teil 10: Verfahren zur Bewertung der Recyclingfähigkeit von Kunststoffverpackungen - Protokolle für Flaschen aus PET

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55.020	Pakiranje in distribucija blaga na splošno	Packaging and distribution of goods in general
83.080.20	Plastomeri	Thermoplastic materials

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English Version

**Packaging - Design for recycling for plastic packaging -
Part 10: Recyclability evaluation process for plastic
packaging - Protocols for PET bottles**

Verpackung - Recyclingorientierte Gestaltung von
Kunststoffverpackungsprodukten - Teil 10: Verfahren
zur Bewertung der Recyclingfähigkeit von
Kunststoffverpackungen - Protokolle für Flaschen aus
PET

This draft European Standard is submitted to CEN members for enquiry. It has been drawn up by the Technical Committee CEN/TC 261.

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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CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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prEN 18120-10:2024 (E)**European foreword**

This document (prEN 18120-10:2024) has been prepared by Technical Committee CEN/TC 261 “Packaging”, the secretariat of which is held by AFNOR.

This document is currently submitted to the CEN Enquiry.

This document has been prepared under a standardization request addressed to CEN by the European Commission. The Standing Committee of the EFTA States subsequently approves these requests for its Member States.

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Introduction

EN 13820 consisting of 15 parts aims via a series of guidelines and protocols to establish consistency and improvement for the Design for recycling of household, industrial and commercial plastic packaging.

- Part 1: Definitions and principles for design-for-recycling of plastic packaging
- Part 2: Process and governance to evaluate the recyclability of plastic packaging
- Part 3: Sorting evaluation process for plastic packaging
- Part 4: Guideline and protocols for PET bottles
- Part 5: Guideline and protocols for PET other rigid packaging
- Part 6: Guideline and protocols for PE and PP rigid packaging
- Part 7: Guideline and protocols for PE and PP flexible packaging
- Part 8: Guideline and protocols for PS packaging
- Part 9: Guideline and protocols for EPS packaging
- Part 10: Recyclability evaluation process for plastic packaging — Protocols for PET bottles
- Part 11: Recyclability evaluation process for plastic packaging — Protocols for PET other rigid packaging
- Part 12: Recyclability evaluation process for plastic packaging — Protocols for PE and PP rigid packaging
- Part 13: Recyclability evaluation process for plastic packaging — Protocols for PE and PP flexible packaging
- Part 14: Recyclability evaluation process for plastic packaging — Protocols for PS packaging
- Part 15: Recyclability evaluation process for plastic packaging — Protocols for EPS packaging

Design for recycling guidelines are a common way of describing compatibility with plastic packaging collection, sorting and recycling into high quality recycled plastic into state-of-the-art facilities. They provide guidance on the level compatibility, defined as:

- green: Packaging constituents with full compatibility with recycling;
- yellow: Packaging constituents with limited compatibility with recycling;
- red: Packaging constituents which are not compatible with recycling.

Recyclability guidelines will require regular review and improvement to reflect innovations in design, collection, sorting and recycling.

The Design for recycling guidelines provided in this series of standards are representative of the state of the art in Europe and cover all steps from design for recycling, packaging waste collection, sorting, recycling into recycled plastic and to use in a new application.

Packaging recyclability is the combination of two parameters: packaging designed for recycling and the existence of a recycling stream. Design for recycling guidelines act as a first indicator.

prEN 18120-10:2024 (E)

1 Scope

This document provides requirements for the evaluation process for PET Bottles with respect to compatibility of the design with recycling processes.

Packaging components and ancillary elements made of other materials than PET are also covered by this document as they need to be evaluated for compatibility with the recycling processes.

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.

prEN 18120-1, *Packaging — Design for recycling of plastic packaging — Part 1: Definitions and principles for design-for-recycling of plastic packaging*

prEN 18120-4, *Packaging — Design for recycling of plastic packaging — Part 4: Guideline for PET bottles*

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 1628-1, *Plastics — Determination of the viscosity of polymers in dilute solution using capillary viscometers — Part 1: General principles (ISO 1628-1)*

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

3 Terms and definitions

For the purposes of this document, the terms and definitions given in prEN 18120-1 apply.

ISO and IEC maintain terminology databases for use in standardization at the following addresses:

- ISO Online browsing platform: available at <https://www.iso.org/obp/>
- IEC Electropedia: available at <https://www.electropedia.org/>

4 Recyclability evaluation process

4.1 Principle

4.1.1 General

This document provides a method of evaluating the technical recyclability of a PET Bottle sample in mechanical recycling processes as they are implemented in Europe. The results characterize both the processability of the sample as well as the quality of the recycled plastic.

Depending on the choice of the sample, the method can either provide a technical recyclability determination for a given packaging design or item, or it can be employed to selectively study the impact of individual design elements of a PET Bottle on technical recyclability.

The latter approach may be employed to generate data for the updating of design-for-recycling guidelines.

The test method follows the steps (unit operations) that occur in a mechanical recycling process for PET bottles and seeks to simulate each operation on a laboratory scale.

The relevant unit operations are shown in Table 1. Steps 0 to 5 describe the plastic recycling process itself whereas step 6 represent the conversion of the recycled PET into articles, either preforms/bottles or plaques. As such, steps 0 to 4 provide information on the processability of the sample whereas step 5 and 6 provide information on the quality of the recycled plastic that can be obtained.

To perform the recyclability Evaluation process, the below elements shall be considered:

- Design for recyclability evaluation process guidelines on PET bottles described by prEN 18120-4, *Packaging — Design for recycling of plastic packaging products — Part 4: Guideline for PET bottles*;
- targeted intended use(s) for the final recyclate, this is needed to ensure the testing will be made in relation to dedicated specifications, as described in prEN 18120-1, *Packaging — Design for recycling of plastic packaging — Part 1: Definitions and principles for design-for-recycling of plastic packaging*.

And in this document:

- list of unit operations for the whole process until the recyclate is used (grinding, washing, extrusion, ... for example);
- specification of unit operations process capability to be used for the evaluation based on state of the art of PET bottle recycling processes in Europe (grinding size for example);
- relevant process conditions settings for testing for all relevant unit operations (temperature for washing for example);
- list of mandatory sampling and tests to be performed on the samples for each unit operation. (IV measurement as per EN ISO 1628-1 for example);
- reference benchmark recommendation values for assessing the results of the tests performed (Colour deviation Delta E below 1 for example) and help building the final assessment.

The goal of the evaluation process is to identify all foreseeable critical points and establish a testing strategy that either confirms or excludes a negative impact for each critical point considered. The testing strategy will use all or only some of the tests described below that will depend on the innovation type and expected impacts on the recycling process and the recyclate. The sample size to be tested is also part of the testing strategy definition. The reasoning for the testing strategy deployed will be described.

The final reporting shall include all relevants related to:

- innovation description;
- intended use of the innovation and assumed market penetration;
- testing strategy reasoning and description;
- relevant elements from tables from 4.2.9, 4.3.5 and 4.4.5;
- all relevant elements used to support assessment;
- final conclusion and result of assessment.

4.1.2 Targeted uses and retained recycling technology

Table 1 describes the targeted uses of the recyclate to be produced and assumed recycling technology to produce the recyclate. It also includes the secondary outlet to be considered and the at scale situation as well as the grading impact to assume when assessing the innovation.

Table 1 — PET bottle recycling state-of-the-art

Packaging type	Recycling type	State-of-the-art outlet
Clear PET bottle	Mechanical recycling	Bottle (contact sensitive)
Coloured PET bottle	Mechanical recycling	Bottle (contact sensitive)
Opaque PET bottle	Mechanical recycling	Bottle (contact sensitive)
White opaque PET bottle	Mechanical recycling	Bottle (contact sensitive)

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