SLOVENSKI STANDARD
oSIST prEN 18120-6:2024

01-oktober-2024

Embalaža - Načrtovanje, ki omogoča recikliranje plastične embalaže - 6. del: Smernica za togo plastično embalažo iz polietilena (PE) in polipropilena (PP)

Packaging - Design for recycling for plastic packaging - Part 6: Guideline for PE and PP rigid packaging

Verpackung - Recyclingorientierte Gestaltung von Kunststoffverpackungsprodukten - Teil 6: Leitfaden und Protokolle für starre Verpackungen aus PE und PP

Ta slovenski standard je istoveten z: **prEN 18120-6**

ICS:

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

oSIST prEN 18120-6:2024 **en,fr,de**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

DRAFT
prEN 18120-6

September 2024

ICS 55.020; 13.030.50; 83.080.20

English Version

Packaging - Design for recycling for plastic packaging - Part 6: Guideline for PE and PP rigid packaging

Verpackung - Recyclingorientierte Gestaltung von Kunststoffverpackungsprodukten - Teil 6: Leitfaden und Protokolle für starre Verpackungen aus PE und PP

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.

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 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, 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 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.

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

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

Contents

Page

European foreword

This document (prEN 18120-6:2024) 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.

Introduction

EN 18120 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: Sortability evaluation process for plastic packaging

— Part 4: Guideline for PET bottles

— Part 5: Guideline for PET rigid packaging (except bottle)

— Part 6: Guideline for PE and PP rigid packaging

— Part 7: Guideline and protocols for PE and PP flexible packaging

— Part 8: Guideline for PS and XPS packaging

— Part 9: Guideline 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 and XPS 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 five parameters: packaging designed for recycling, packaging waste collection, sorting when necessary, recycling and use of recycled plastic in a new application. This series of standards covers one parameter: the design for recycling.

1 Scope

This document covers the design of PE and PP rigid packaging with respect to compatibility of the design with the collecting, sorting, and recycling processes.

Packaging constituents and packaging components made of other materials than PE and PP are also covered by this standard as they need to be evaluated on compatibility with polymer recycling.

2 Normative references

The following documents are referred to in the text in such a way 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 18120-3, *Packaging — Design for recycling of plastic packaging — Part 3: Sortability evaluation process for plastic packaging*

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 Compatibility of PE and PP-based rigid packaging designs with recycling

4.1 General

To determine the recyclability of the design of a PE or PP rigid packaging, the following guidance tables shall be consulted in conjunction with the definitions provided in prEN 18120-1, *Packaging — Design for recycling of plastic packaging products — Part 1: Definitions and principles for design-for-recycling of plastic packaging*. The tables provide combined design guidance for all considered recycling processes.

The design guidance provided in this document covers a) main packaging components which constitute PE or PP-based flexible packaging, with all their integrated components and all constituents, including those which are removed during the recycling process and b) separate components of other types of packaging which constitute PE or PP flexible materials, with all their constituents, including those which are removed during the recycling process.

It does not apply to other types of separate components (which are already separated before the sorting process) as per the definition of part 1 of this series of standards and as determined according to part 3 of this series of standards. Separate components are to be evaluated separately, as described in part 1 of this series of standards. As such, a separate component can be fully compatible with recycling even when an integrated component or a constituent of the same specification would only have limited or no compatibility with recycling according to the guidance in this document. Equally, separate components can be not compatible with recycling even when an integrated component would be compatible.

4.2 Sortability and residual content after emptying

The design guidance provided by this standard considers effects on the sortability of packaging. It does however not provide details on established sorting processes or a method for determining sortability. Where sortability testing is advised in the guidance of this document, the provisions of prEN 18120-3, *Packaging — Design for recycling of plastic packaging — Part 3: Sortability evaluation process for plastic packaging* shall apply. This includes the consideration of the effects of residual product content after emptying on the sortability.

4.3 Copolymers of PE and PP

PE used in the production of rigid packaging can include additional constituents and/or components such as ethylene copolymers. Such copolymers include for example ethylene butyl acrylate (EBA), ethylene acrylic acid (EAA) and its zinc, sodium and potassium ionomers, ethylene vinyl acetate (EVA), ethylene methyl acetate (EMA), ethylene ethyl acrylate (EEA), ethylene methacrylic acid (EMAA) and its zinc, sodium and potassium ionomers, and polyethylene-grafted maleic anhydride (PE-g-MAH)) and cycloolefin copolymers as well as ethylene-based elastomers. Ethylene copolymers are considered fully recycling compatible constituents and/or components of PE as long as the polar comonomer content is less than 5 % of the total packaging mass[1]. If the comonomer level is above this threshold, they are considered limited compatible with recycling unless data are available that would indicate the contrary. No upper limit is considered for non-polar comonomers like alpha olefins and norbornene. However, if the comonomer content is equal or greater than 50 %wt, the copolymer is no longer considered a PE copolymer but a copolymer of the other comonomer. For such cases, the classification of PE copolymers in the design guidance tables shall not apply and the material shall be considered separately.

PP used in the production of rigid packaging can include additional constituents and/or components such as polypropylene copolymers. Copolymers may comprise ethylene, higher alpha-olefins, cycloolefins and dienes as comonomers. Furthermore, PP polymers can be grafted with MAH. If the comonomer content is equal or greater than 50 %wt, the copolymer is no longer considered a PP copolymer but a copolymer of the other comonomer. For such cases, the classification of PP copolymers in the design guidance tables shall not apply and the material shall be considered separately.

4.4 Packaging format specific design guidance

4.4.1 General

The tables in this subclause provide differentiated design guidance for PE and PP rigid packaging, acknowledging differences between both the properties of these plastics as well as parameters of their recycling processes and different possible end uses for the recycled plastic.

When both PE and PP are present in a packaging design, the choice of design guidance table shall be based on the dominant material, by weight, in the main component of the packaging at the stage of disposal.

Further differentiation is provided between natural colour packaging, and coloured packaging. This differentiation is made as the sorting of plastic waste by colour and subsequent separate recycling of natural colour and coloured packaging waste is common in Europe. Annex A provides a further explanation why colouration and printing is a requirement for many types of household rigid packaging applications.

For natural colour PE based rigid packaging (i.e. no colour in the plastic and mostly unprinted), the guidance in Table 1 applies. For PE based rigid packaging coloured (through colour in the plastic material or by direct printing or through other constituents giving a colour), the guidance in Table 2 applies.

[1] For example, if EVA with 18 % wt vinyl acetate comonomer content is used at a 10 %wt level in a package then the polar comonomer content in that package is 1,8 %wt and the 5 %wt limit is fulfilled.

For natural colour PP based rigid packaging (i.e. no colour in the plastic and mostly unprinted), the guidance in Table 3 applies. For coloured PP based rigid packaging (through colour in the plastic material or by direct printing or through other constituents giving a colour), the guidance in Table 4 applies.

4.4.2 White packaging

No specific guidance tables are provided in this standard for the special case of white (rather than natural colour or coloured) packaging designs, made from PE or PP as different scenarios exist for the recycling of such packaging, either with the coloured stream or in a separate white stream. When designing such packaging, attention should be paid to a high degree of lightness of the colour. Regarding other constituents, the tables in this standard can be consulted for orientation.

4.5 Design guidelines summary table

Table 1 — Guideline table for natural PE rigid packaging

	GREEN CATEGORY Full compatibility	YELLOW CATEGORY Limited compatibility	RED CATEGORY No compatibility
Materials (of the main component)	PE (HDPE, LDPE, LLDPE); Nonpolar ethylene copolymers and homopolymers; Polar ethylene copolymers with a comonomer content representing not more than 5 % wt of comonomer in the structure[2]	≤ 10 %wt PP for the integrated components;	PET, PVC, PS; Biodegradable, compostable polymers; > 10 %wt PP for the integrated components; PLA, PVC, PS, PET and PETG Cellulose fibres; Aluminium; Other materials (wood, ceramic, glass)
Barrier layers, barrier coatings[3]	EVOH ≤ 6,0 %wt + PE-g-MAH tie layers with MAH > 0,1 %wt; EVOH:tie layers ratio ≤ 2; Enkase (fluorination); In-mould fluorination; SiOx Plasma Coating; AlOx and SiOx without additional primer or coating[4]; ≤ 10 % PA6 and PA6/66 with PE-MAH tie layer + compatibilizer	EVOH > 6,0 %wt + PE-g-MAH tie layers with MAH > 0,1 %wt; EVOH:tie layers ratio ≥ 2; EVOH ≤ 1 %wt with any other tie layers; Plasma Fluorination; Metallisation; PVOH ≤ 1 %wt; ≤ 25 % PA6 and PA6/66 with PE-MAH tie layer	EVOH > 6 %wt with any other tie layers; Aluminium foil; PVDC, PVC; Metallisation; Iron
Pigments (in the main component)	No pigment other	Transparent light colours; translucent colours	Carbon black; Metallic pigments in mass colouration

[2] Including EVA, EMA, EEA and EBA as well as MAH

[3] Applies to all integrated components of the packaging

[4] Statement only on AlOx and SiOX itself. Primers and coatings applied together with AlOx or SiOx need to be evaluated separately