

ICS 83.080.01

CCS G 31



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 46020.1-2025

Plastics - Guide of design for recycling - Part 1: Poly(ethylene terephthalate) (PET) materials

塑料 可回收再生设计指南 第1部分：聚对苯二甲酸乙二醇酯（PET）材料

Issued on: August 1, 2025

Implemented on: February 1, 2026

**Issued by: State Administration for Market Regulation;
Standardization Administration of the PRC**

Table of Contents

Foreword	3
Introduction	5
1 Scope	6
2 Normative references	6
3 Terms and definitions	6
4 Symbols and abbreviations	11
5 Classification	11
6 Basic principles	12
7 Design elements	12
8 Test methods	18
9 Determination for the classification of design for recycling	21
Appendix A (Normative) Preparation of test samples for recyclability assessment	23
Appendix B (Normative) PET flake agglomeration test method	29
Appendix C (Normative) PET flake baking test method	31
Appendix D (Normative) Characterization method of melt extrusion pressure variation	33
Appendix E (Normative) PET product attachment and label float-sink separation test method	35
Appendix F (Normative) Methods for determining the transparency or opacity of PET products	38
Appendix G (Normative) Recommended values for classification test of design for recycling of PET products	40
Bibliography	41

1 Scope

This document provides guidance on the classification, basic principles, design elements, testing methods, and classification criteria for design for recycling of poly(ethylene terephthalate) (PET) materials.

This document applies to the design for recycling of PET or rigid packaging containers with PET as the main component, and thermoformed products made from PET sheets, which are already in or intended to be included in plastic recycling systems.

This document does not apply to the design for recycling of products such as PET fibers and films.

2 Normative references

GB/T 1844

GB/T 2035

GB/T 14190-2017

GB/T 17931

GB/T 19466.3

GB/T 22396

GB/T 40006.9

3 Terms and definitions

For the purposes of this document, the terms and definitions given in GB/T 2035 and GB/T 22396, as well as the following apply. shrink sleeve label A label form in which a pre-printed sleeve is placed around a container and, upon heating, shrinks to conform closely to the surface of the container.

Note. Shrink sleeve labels can cover any position or area from the top to the bottom of a container.

3.23 polyolefin pump/dispenser

A pump/dispenser that contains no metal or inorganic non-metallic material and is mainly made from materials such as polypropylene (PP), high-density polyethylene (PE-HD), low-density polyethylene (PELD), and polyethylene (PE) copolymers.

4.1 Symbols

The following symbols apply to this document.

a* value Parameter in a colorimeter representing the variation of an object's color from red to green
b* value Parameter in a colorimeter representing the variation of an object's color from yellow to blue
L* value Parameter in a colorimeter representing the lightness of an object

4.2 Abbreviated terms

For the purposes of this document, the terms and definitions given in GB/T 1844 (all parts), as well as the following, apply.

PA MXD6.Poly(meta-xylylene diamine)

5 Classification

Based on the product's performance in the recycling stream after consumption and the properties of recycled plastics, the design of plastic products shall be classified into design for recycling and non-recyclable design. Where, design for recycling is classified into. -- readily recyclable design;

-- improvement-needed recyclable design.

6 Basic principles

6.1 On the basis of meeting functional and safety requirements, the design of PET products should fully consider their compatibility with plastic recycling systems after consumer use.

6.2 The design for recycling of PET products should facilitate the enhancement of the value of post-consumer PET recycling, improve the efficiency of PET recycling processes, and enhance the quality of recycled PET.

6.3 An important basis for assessing the recyclability of PET products is the

performance requirements of the intended applications for recycled PET. Downstream applications of recycled PET include container packaging, chemical fibers, sheets, and strapping. PET container packaging should preferably be designed so that, after recycling, it can be reused for its original application.

6.4 When PET products contain multiple non-PET materials or other contaminants, the

design should take into account the ease of separation during post-consumer recycling.

Density sorting is the preferred method for separating non-PET materials or other contaminants from PET, followed by color sorting or material sorting to remove non- target materials.

6.5 As PET thermoformed products differ from PET bottles in both product

characteristics and recycling processes, the factors to be considered in their design should be selected according to the specific characteristics of the products.

6.6 The recyclability of a PET product is determined by the impact of each of its design elements on the recycling process. Any design element that adversely affects recycling will reduce the overall recyclability of the product.

7.1.1 The base resin should preferably be a general-purpose PET bottle resin. The

properties of PET resin should meet the requirements of GB/T 17931, and the properties of

recycled PET resin should meet the requirements of GB/T 40006.9. The intrinsic viscosity, melting point, and monomer content of terephthalic acid and ethylene glycol in the base resin of PET products are all important factors to consider. It is advisable to select PET resin with an intrinsic viscosity ≥ 0.72 dL/g, a melting point of 235°C~255°C, and a total content of terephthalic acid monomer and ethylene glycol monomer greater than 95% of the total monomer mass.

Note. The melting point is the result of a nitrogen gas test.

7.1.2 Post-consumer recycled PET (mechanical recycling, physical recycling, chemical

recycling) and bio-based PET are both suitable as base resins, and their properties are described in 7.1.1.

7.1.3 PET homologous resins, modified PET products, and mixtures with other resins

should be subjected to the tests required for assessing PET recyclability to determine their compatibility with PET recycling systems.

7.1.4 The classification of design for recycling of base resins is shown in Table 1.

Table 1 - Classification of design for recycling of base resins

7.2.1 Barrier materials are often added to PET packaging containers to protect the

contents. The forms of barrier materials include coatings, barrier layers and additives.

The addition of different barrier materials has different effects on PET recycling, such as compatibility with PET recycling streams, color value and performance of recycled PET, etc. Therefore, it is crucial to determine the impact of barrier materials on PET recycling through experimental testing.

7.2.2 Barrier materials should not be added to colorless and transparent bottles. If it is necessary to add them, relevant tests should be conducted. For the use of barrier materials that affect the color value of recycled PET, it is advisable to declare or label information about the presence of barrier materials. The color of the barrier layer should match the color of the product's appearance.

Note. Information declared or labeled on a product includes text, symbols, colors, etc.