

ICS 83.080.20

CCS G32



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

GB/T 40006.2-2021

Plastics - Recycled plastics - Part 2: Polyethylene (PE) materials

塑料 再生塑料 第2部分：聚乙烯(PE)材料

Issued on: May 21, 2021

Implemented on: December 1, 2021

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

Table of Contents

1	Scope
2	Normative references
3	Terms and definitions
4	Classification and designation...
5	Requirements...
6	Test methods...
6.3	Standard atmospheres for conditioning and testing of specimens
6.4	Qualitative analysis of main material
7	Inspection rules
7.1	Inspection classification and inspection items
7.1.2	Inspection items
8	Marking
9	Packaging, transportation and storage

1 Scope

Part 2 of China's national standard series for recycled plastics, covering polyethylene. It specifies the classification and naming, the requirements, the test methods and the inspection rules. Polyethylene is the highest volume plastic and the one most recycled by tonnage, arriving as bottles, film, pipe, crates and drums. Its recycling difficulty is not chemical - the polymer is robust and reprocesses well - but that polyethylene is not one material. High density, low density and linear low density grades look identical, are collected together, and are incompatible in a melt: a high density product contaminated with low density loses stiffness and creep resistance, and film grade contaminated with bottle grade will not blow. Sorting them apart requires more than a density separation, which is why the classification in this part is built around the grade family as well as the source, and why the melt flow rate is the property that reveals a mixed feed.

This document specifies the classification and designation, requirements, test methods, inspection rules, marking, packaging, transportation and storage, etc. of polyethylene recycled plastics. This document applies to polyethylene recycled plastic particles made from waste polyethylene plastics as raw materials through processes such as screening, classification, cleaning, melt extrusion granulation (including granulation processes such as bracing, hot cutting and/or water cutting). The matrix of the polyethylene recycled plastic is all ethylene homopolymers specified in GB/T 1845.1, as well as other ethylene copolymers

with 1-olefin monomers less than 50% in mass fraction and non-olefin monomers (containing functional groups) not more than 3% in mass fraction. This document does not apply to polyethylene recycled plastics from hazardous wastes and radioactive wastes such as medical waste, pesticide packaging. This document does not apply to polyethylene and polypropylene mixed recycled plastics.

2 Normative references

The contents of the following documents, through normative references in this text, constitute indispensable provisions of this document. Among them, for dated references, only the edition corresponding to that date applies to this document. For undated references, the latest edition (including all amendments) applies to this document.

GB/T 1033.1 Plastics - Methods for determining the density of non-cellular plastics - Part 1: Immersion method, liquid pycnometer method and titration method

GB/T 1040.2 Plastic - Determination of tensile properties - Part 2: Test conditions for moulding and extrusion plastic

GB/T 1845.2-2006 Plastics - Polyethylene (PE) moulding and extrusion materials - Part 2: Preparation of test specimens and determination of properties

GB/T 2035 Terms and definitions for plastics

GB/T 2547 Plastic resins - Sampling

GB/T 2918 Plastics - Standard atmospheres for conditioning and testing

GB/T 3682.1 Plastics - Determination of the melt mass-flow rate (MFR) and melt volume-flow rate (MVR) of thermoplastics - Part 1: Standard method

GB/T 8170 Rules of rounding off for numerical values and expression and judgement of limiting values

GB/T 9345.1-2008 Plastics - Determination of ash - Part 1: General methods

GB/T 17037.1-2019 Plastics - Injection moulding of test specimens of thermoplastic materials - Part 1: General principles, and moulding of multipurpose and bar test specimens

GB/T 19466.3 Plastics - Differential scanning calorimetry (DSC) - Part 3: Determination of temperature and enthalpy of melting and crystallization

GB/T 19466.6 Plastics - Differential scanning calorimetry (DSC) - Part 6: Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT)

GB/T 30102 Plastics - Guidelines for the recovery and recycling of plastic waste

3 Terms and definitions

The terms and definitions defined in GB/T 40006.1-2021, GB/T 2035 and GB/T 1845.2-2006. When the MFR (190 °C,

2.16 kg) of the polyethylene recycled plastic is greater than or equal to

1.0 g/10 min, it is recommended to use the injection moulding method to prepare the specimens. The MFR determination is carried out in accordance with the provisions of GB/T 3682.1. According to GB/T 17037.1-2019, prepare specimens. The shape of the specimen conforms to the tensile specimen type A1 and the bar specimen type B1 (80 mmx10 mmx4 mm) specified in GB/T 37426.

6.2.2 Preparation of compression-moulded test pieces For the preparation of compression-moulded test pieces of polyethylene recycled plastic, see the provisions of

3.3 in GB/T 1845.2-2006. When the MFR (190 °C,

2.16 kg) of polyethylene recycled plastic is less than

1.0 g/10 min or is required, the specimen is prepared by compression moulding. Use punching or machining methods to prepare tensile specimen type A2 and bar specimen type B3 (80 mmx10 mmx4 mm), which are in accordance with GB/T 37426, from compression-moulded test pieces with a thickness of 4 mm.

6.3 Standard atmospheres for conditioning and testing of specimens

6.3.1 Conditioning of specimens Unless otherwise specified in the test method, for unfilled PE recycled plastic, the conditioning of the specimen shall be in accordance with the provisions of GB/T 2918. The atmosphere for conditioning is temperature 23 °C±2 °C; time is at least 16 h. For the specimens of filled PE recycled plastic material, the requirement of relative humidity of 50%±10% shall be added.

6.3.2 Standard atmospheres for testing All tests shall be carried out in the standard test atmospheres specified in GB/T 2918. The temperature is 23 °C±2 °C. The relative humidity is 50%±10%.

6.4 Qualitative analysis of main material

6.4.1 Infrared According to the infrared spectroscopy of transmission method and attenuated total reflection method specified in Appendix A of GB/T 40006.1-2021, the material is qualitatively determined. The film pressing temperature is 180 °C. The recommended film thickness is 30 µm~40 µm. - The standard deviation of nominal strain ϵ_B at tensile break; - The average value of nominal strain ϵ_B at tensile break.

6.14 Oxidation induction time (OIT) Test according to GB/T 19466.6. The test temperature

is 200 °C. The test container is an aluminum dish. Take three specimens for testing and report the average value.

7.1 Inspection classification and inspection items

7.1.1 Inspection classification The inspection of polyethylene recycled plastic products can be divided into two types: exit-factory inspection and type inspection.

7.1.2 Inspection items

7.1.2.1 Exit-factory inspection items The exit-factory inspection of polyethylene recycled plastics shall include at least:

- a) Particle appearance;
- d) Melt mass-flow rate;

7.1.2.2 Type inspection items All items in Clause 5 are type inspection items. In the following situations, type inspection shall be carried out:

- a) When a new product is trial-produced and pattern-evaluated;
- b) After formal production, if there are major changes in raw materials or processes, which may affect product properties; by a product quality inspection conformity certificate. The conformity certificate shall indicate the product name, designation, lot number, executive standard; and be stamped with a special seal for quality inspection.

7.3.2 Reinspection rules If an indicator of the inspection results does not meet the requirements of this document, samples from this lot of products with double the number of sampling units can be used to reinspect the item. The reinspection result shall be used as the basis for the quality determination of this lot of products.

8 Marking

There shall be a clear mark on the outer packaging bag of polyethylene recycled plastic. The content of the mark may include: trademark, name of manufacturer, address of manufacturer, standard number, product name, designation, lot number (including production date), and net content, etc. It shall be marked in a conspicuous place: "recycled plastic" or "REC".

9 Packaging, transportation and storage

9.1 Packaging Polyethylene recycled plastic can be packed in heavy packaging bags, polypropylene composite woven bags, or other packaging forms. During transportation, stacking and storage, packaging materials shall be guaranteed to be free from pollution and leakage. The net content of each bag of product can be 25 kg or other.