

ICS 83.080.20

CCS G32



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

GB/T 40006.3-2021

**Plastics - Recycled plastics - Part 3: Polypropylene (PP)
materials**

塑料 再生塑料 第3部分：聚丙烯(PP)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 Introduction...
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 3 of China's national standard series for recycled plastics, covering polypropylene. It specifies the classification and naming, the requirements, the test methods and the inspection rules. Polypropylene recycling has a specific and well understood problem: the polymer degrades by chain scission each time it is melted, so the melt flow rate rises with every pass and the impact strength falls, and unlike polyethylene it does not tolerate this quietly. The material also arrives from two very different streams - the homopolymer of packaging and housewares, and the impact copolymer of automotive bumpers and battery cases - which have different properties and different additive packages and cannot simply be blended. What makes it worth doing is that recycled polypropylene from a controlled source is genuinely good material: the automotive stream in particular is clean, identifiable and returns to the same application, which is the closed loop that recycling is supposed to achieve and rarely does.

This document specifies the classification and designation, requirements, test methods, inspection rules, marking, packaging, transportation and storage, etc. of polypropylene recycled plastics. This document applies to polypropylene recycled plastic particles made from waste polypropylene 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 polypropylene recycled plastic is

all propylene homopolymers specified in GB/T 2546.1, as well as other propylene copolymers with 1-olefin monomers less than 50% in mass fraction, and a blend of the above polymers with a mass fraction of not less than 50%. This document does not apply to polypropylene 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 1043.1-2008 Plastics - Determination of Charpy impact properties - Part 1: Non-instrumented impact test

GB/T 2035 Terms and definitions for plastics

GB/T 2546.2-2003 Plastics - Polypropylene (PP) moulding and extrusion materials - Part 2: preparation of test specimens and determination of properties

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 9341 Plastics - Determination of flexural properties

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

6 Test methods

6.1 Determination of test results For the test results, adopt the rounding value comparison method. It shall be carried out in accordance with the provisions of GB/T 8170.

6.2 Specimen preparation For the preparation of injection-moulded specimens of polypropylene recycled plastic, see the provisions of

3.2 in GB/T 2546.2-2003. 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.

6.3 Standard atmospheres for conditioning and testing of specimens

6.3.1 Conditioning of specimens Unless otherwise specified in the test method, for unfilled PP recycled plastic, the conditioning of the specimen shall be in accordance with the provisions of GB/T 2918. The atmosphere for conditioning is temperature $23\text{ }^{\circ}\text{C}\pm 2\text{ }^{\circ}\text{C}$; time is at least 40 h and not more than 96 h. For the specimens of filled PP recycled plastic material, the requirement of relative humidity of $50\%\pm 10\%$ 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 $23\text{ }^{\circ}\text{C}\pm 2\text{ }^{\circ}\text{C}$. The relative humidity is $50\%\pm 10\%$.

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 $210\text{ }^{\circ}\text{C}$. The recommended film thickness is $30\text{ }\mu\text{m}\sim 40\text{ }\mu\text{m}$. For the compressed film samples, perform full-band infrared spectroscopy scans. The resolution is 4 cm^{-1} . The number of scans is at least 32 times.

6.14 Charpy notched impact strength The injection-moulded specimens are type B1 80 mmx10 mmx4 mm bar specimens prepared according to 6.2. The conditioning of specimens and the standard atmospheres for testing shall be carried out in accordance with 6.3. The test is carried out in accordance with the provisions of GB/T 1043.1-2008. It is recommended to use machined notch. The spline shall be notched within 1 h~4 h of injection moulding. The notch type is type A.

6.15 Oxidation induction time Test according to GB/T 19466.6. The test temperature is $200\text{ }^{\circ}\text{C}$. 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 polypropylene 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 polypropylene recycled plastics shall include at least:

- a) Particle appearance;
- d) Melt mass-flow rate;
- e) Tensile strength;

7.1.2.2 Type inspection items Polypropylene recycled plastics shall be inspected by the quality inspection department of the manufacturer in accordance with the test methods specified in this document. According to the inspection results and the requirements of this document, the quality of the product shall be determined and the certification be provided. When the products leave the factory, each lot of products shall be accompanied 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 polypropylene 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 Polypropylene 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.