



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

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**Plastics - Polypropylene(PP) moulding and extrusion materials -
Part 2: Preparation of test specimens and determination of
properties**

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Table of Contents

Foreword	3
Introduction	5
1 Scope	6
2 Normative References	6
3 Terms and Definitions	9
4 Specimen Preparation	9
5 Specimen Conditioning	10
6 Determination of Properties	10
Appendix A (informative) A Comparison List of Normative References between this Document and ISO 19069-2:2016	15
Bibliography	17

1 Scope

This document specifies the methods and conditions for the specimen preparation and properties determination of polypropylene (PP) molding and extrusion materials. This document also specifies the requirements for the pre-treatment of test materials and the conditioning of specimens before testing.

This document lists properties and test methods suitable and necessary for characterizing polypropylene (PP) molding and extrusion materials. These properties are selected from the general test methods of GB/T 19467.1. This document also lists other test methods extensively applied or of special significance for molding and extrusion materials, as well as the determination methods of the properties designation in Part 1.

In order to ensure that the test results are reproducible and repeatable, it is necessary to use the methods of specimen preparation and conditioning specified in this document, as well as the specified specimen sizes and test methods. The test data obtained using specimens prepared under different conditions or using specimens of different sizes may not be consistent.

2 Normative References

The contents of the following documents constitute indispensable clauses of this document through the normative references in the text. In terms of references with a specified date, only versions with a specified date are applicable to this document. In terms of references without a specified date, the latest version (including all the modifications) is applicable 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 1033.1-2008, ISO 1183-1:2004, IDT)

GB/T 1033.2 Plastics - Methods for Determining the Density of Non-cellular Plastics - Part 2:

Density Gradient Column Method (GB/T 1033.2-2010, ISO 1183-2:2004, MOD)

GB/T 1033.3 Plastics - Methods for Determining the Density of Non-cellular Plastics - Part 3:

Gas Pycnometer Method (GB/T 1033.3-2010, ISO 1183-3:1999, IDT)

GB/T 1034 Plastics - Determination of Water Absorption (GB/T 1034-2008, ISO 62:2008, IDT)

GB/T 1040.2 Plastics - Determination of Tensile Properties - Part 2: Test Conditions for Molding and Extrusion Plastics (GB/T 1040.2-2022, ISO 527-2:2012, IDT)

GB/T 1043.1 Plastics - Determination of Charpy Impact Properties - Part 1: Non-instrumented Impact Test (GB/T 1043.1-2008, ISO 179-1:2000, IDT)

GB/T 1043.2 Plastics - Determination of Charpy Impact Properties - Part 2: Instrumented Impact Test (GB/T 1043.2-2018, ISO 179-2:1997, IDT)

GB/T 1408.1 Insulating Materials - Test Methods for Electric Strength - Part 1: Test at Power Frequencies (GB/T 1408.1-2016, IEC 60243-1:2013, IDT)

GB/T 1409 Recommended Methods for the Determination of the Permittivity and Dielectric Dissipation Factor of Electrical Insulating Materials at Power, Audio and Radio Frequencies including Meter Wavelengths (GB/T 1409-2006, IEC 60250:1969, MOD)

GB/T 1632.3 Plastics - Determination of the Viscosity of Polymers in Dilute Solution Using Capillary Viscometer - Part 3: Polyethylenes and Polypropylenes (GB/T 1632.3-2010, ISO 1628-3:2001, MOD)

GB/T 1634.2 Plastics - Determination of Temperature of Deflection under Load - Part 2: Plastics and Ebonite (GB/T 1634.2-2019, ISO 75-2:2013, MOD)

GB/T 2406.2 Plastics - Determination of Burning Behavior by Oxygen Index - Part 2: Ambient-temperature Test (GB/T 2406.2-2009, ISO 4589-2:1996, IDT)

GB/T 2408 Plastics - Determination of Burning Characteristics - Horizontal and Vertical Test (GB/T 2408-2008, IEC 60695-11-10:1999, IDT)

GB/T 2918 Plastics - Standard Atmospheres for Conditioning and Testing (GB/T 2918-2018,

ISO 291:2008, MOD)

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 3682.1-2018, ISO 1133-1:2011, MOD)

GB/T 4207 Method for the Determination of the Proof and the Comparative Tracking Indices of Solid Insulating Materials (GB/T 4207-2012, IEC 60112:2009, IDT)

GB/T 9341 Plastics - Determination of Flexural Properties (GB/T 9341-2008, ISO 178:2001, IDT)

GB/T 9352 Plastic - Compression Molding of Test Specimens of Thermoplastic Materials (GB/T 9352-2008, ISO 293:2004, IDT)

GB/T 11546.1 Plastic - Determination of Creep Behavior - Part 1: Tensile Creep (GB/T 11546.1-2008, ISO 899-1:2003, IDT)

ASTM D5420 Standard Test Method for Impact Resistance of Flat, Rigid Plastic Specimen by Means of a Striker Impacted by a Falling Weight (Gardner Impact)

3 Terms and Definitions

This document does not have terms or definitions that need to be defined.

4.1 General Rules

Whether it is injection molding or compression molding, it is quite necessary to adopt the same conditions and procedures to prepare specimens.

Table 3 and Table 4 provide the conditions of each test method. In the column of letters of specimen preparation in the tables, M means injection molding and Q means compression molding.

4.2 Pre-treatment Materials before Molding

Before molding, the test materials generally require no pre-treatment.

4.3 Injection Molding

The injection molded specimens shall be carried out in accordance with the stipulations of GB/T 17037.1 or GB/T 17037.3, and the conditions specified in Table 1 shall be used.

During injection molding, proper packing pressure shall be used to obtain defect-free molded parts. The uniformity shall be inspected by weighing the mass of the molded parts,

and the mass deviation shall not exceed 1% of the mass of the molded parts.

Certain heat-sensitive polypropylenes may cause molecular degradation during the molding process. The melt mass-flow rate (MFR) value of these materials after molding greater than 1.5 times the original value shall be avoided. If the MFR value exceeds 1.5 times the original value, the melt temperature shall be reduced by 10 °C each time, until the MFR value is less than 1.5 times the original value. The adjustment of the melt temperature shall be stated in the test report.

4.4 Compression Molding

Compression-molded sheets shall comply with the stipulations of GB/T 9352 and adopt the conditions specified in Table 2.

During compression molding, frame molds can be used, but full pressure shall be maintained while starting to cool. This can prevent the melt from being forced out of the frame or becoming pitted.

When using the frame molds, the full pressure acts on the mold frame, and the test specimens may be subject to uneven force, resulting in insufficient fusion of particles.

The specimens used for property testing shall be prepared from compression-molded test specimens through the method of stamping or machining in accordance with the stipulations of

GB/T 39812.

NOTE: the method of stamping can facilitate the preparation of specimens with a thickness less than or equal to 4 mm, and compared with milling or sawing, the stress and specimen deformation are smaller.

5 Specimen Conditioning

Unless it is otherwise specified, the conditioning of unfilled PP specimens shall be carried out in accordance with the stipulations of GB/T 2918. The conditions of the conditioning are: temperature (23 ± 2) °C and time at least 40 h, but not more than 96 h.

The filled PP specimens and the specimens used for electrical performance determination shall also have an additional requirement for relative humidity (50 ± 10)%.

6 Determination of Properties

The determination of properties and data presentation of polypropylene shall use the standards, supplementary instructions and notes listed in GB/T 19467.1. Unless it is otherwise specified in Table 3 and Table 4, the unfilled PP specimen test shall be carried out under the standard test