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

GB/T 47391.2-2026

**Plastics - Unsaturated-polyester powder moulding compounds
(UP-PMCs) - Part 2: Preparation of test specimens and
determination of properties
(English Translation)**

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1 Scope

This document describes the methods for preparation of test specimens and the test methods for properties of unsaturated-polyester powdered moulding compounds (UP-

PMCs), and specifies the requirements for handling test materials, as well as the requirements for conditioning the test materials before moulding and the test specimens before testing.

This document applies to the preparation of test specimens and tests of properties of unsaturated-polyester powdered moulding compounds (UP-PMCs), provides the procedures and conditions for the preparation of test specimens and the methods for using these test specimens for testing properties, and lists the applicable and necessary properties for characterizing PMCs and their test methods.

The properties are selected from the general test methods in GB/T 19467.1. Other widely used test methods or those particularly relevant to PMCs are also included in this document, such as the characteristic properties in GB/T 47391.1.

To obtain reproducible and comparable test results, it is crucial to adopt the test specimen preparation methods, conditioning methods, test specimen dimensions, and test procedures specified in this document. Test results obtained using different test specimen dimensions or different preparation methods may not be consistent.

2 Normative references

The following referenced documents are indispensable for the application 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.

GB/T 1033.1 Plastics - Methods for determining the density of non-cellular plastics

- Part 1.Immersion method, liquid pyknometer method and titration method (GB/T

1033.1-2008, ISO 1183-1.2004, IDT)

GB/T 1034 Plastics - Determination of water absorption (GB/T 1034-2008, ISO

62.2008, IDT)

GB/T 39818 Plastics - Thermosetting moulding materials - Determination of shrinkage

(GB/T 39818-2021, ISO 2577.2007, MOD)

GB/T 46607.1 Plastics - Injection moulding of test specimens of thermosetting powder

moulding compounds (PMCs) - Part 1.General principles and moulding of multipurpose test specimens (GB/T 46607.1-2025, ISO 10724-1.1998, MOD)

GB/T 46607.2 Plastics - Injection moulding of test specimens of thermosetting powder

moulding compounds (PMCs) - Part 2.Small plates (GB/T 46607.2-2025,

ISO 10724-2.1998, MOD)

GB/T 47391.1 Plastics - Unsaturated-polyester powder moulding compounds (UP-

PMCs) - Part 1.Designation system and basis for specifications (GB/T 47391.1-

2026, ISO 14530-1.1999, MOD)

ISO 4614 Plastics - Melamine-formaldehyde mouldings - Determination extractable

formaldehyde

ISO 6603-2 Plastics - Determination of puncture impact behaviour of rigid plastics

- Part 2.Instrumented impact testing

ISO 7808 Plastics - Thermosetting moulding materials - Determination of transfer flow

ISO 8256 Plastics - Determination of tensile-impact strength

3 Terms and definitions

For the purpose of this document, the terms and definitions defined in GB/T 2035 and

GB/T 47391.1, as well as the following apply.

3.1

thermal flow

A parameter that characterizes the flow behavior of thermosetting moulding compounds in the plasticized state.

NOTE: For example, the material's property of filling a mould cavity is expressed as transfer flow

determined by ISO 7808.

4.1 General rules

It is crucial to ensure that test specimens are prepared under the same processing conditions and using the same processing methods (whether injection moulding or compression moulding).

The processing methods used for each test method are described in Tables 3 and 4 (M = injection moulding, Q = compression moulding).

Materials shall be stored in a moisture-proof container before use.

The moisture content of filled and reinforced materials shall be expressed as a percentage of the total mass of the compound.

4.2 Pretreatment of materials

Before injection moulding, pretreatment is generally not required. If treatment is necessary, it shall be performed according to the material manufacturer's recommendations.

Before compression moulding, pretreatment can be performed according to the provisions of GB/T 5471-2008, specifically 5.2 (pre-formed ingots), 6.2 (drying), 6.3 (high-frequency preheating), or 6.4 (pre-plasticization).

4.3 Injection moulding

Injection-moulded test specimens shall be prepared using the conditions specified in Table 1, according to GB/T 46607.1 and/or GB/T 46607.2.

Table 1 -- Conditions for injection moulding of test specimens

Injection moulding conditions can be selected within the range given in Table 1.

However, as stated in sentence 1 of 4.1, these are specific values (not ranges) for each specific test specimen.

- melt temperature (TM);
- mould temperature (TC);
- cure time (tCR).

The cure time (tCR) depends on the curing performance of the UP-PMC under test and the pretreatment method. For any type of UP-PMC, all test specimens of the same thickness shall use the same cure time, which shall be noted along with the test results.

The set cure time shall ensure that all the test specimens are cured as completely and uniformly as possible.

NOTE: For UP-PMCs with poor thermal flow, the following situations may occur.

- certain products can be injection moulded to meet the expected quality requirements, but test specimens cannot be injection moulded (e.g., type A multipurpose test specimens of GB/T

11997 or type D1/D2 small square plate test specimens of GB/T 46607.2).

In this case, and only in this case, the following test specimens are recommended.

- prepared by compression moulding according to GB/T 5471-2008;
- or prepared from compression-moulded type E plates (120 mm x 120 mm x thickness) of GB/T

5471-2008 as specified in GB/T 39812.

4.4 Compression moulding

Compression-moulded test specimens shall be prepared using the conditions specified in Table 2, according to GB/T 5471-2008.

Table 2 -- Conditions for compression moulding of test specimens

Compression moulding conditions can be selected within the range given in Table 2.

However, as stated in sentence 1 of 4.1, these are specific values (not ranges) for each specific test specimen.

- mould temperature (TC);
- mould pressure (PM);
- cure time (tCR).

The cure time tCR depends on the curing performance of the UP-PMC under test and the pretreatment method. For any type of UP-PMC, all test specimens of the same thickness shall use the same cure time, which shall be noted along with the test results.

The set cure time shall ensure that all the test specimens are cured as completely and uniformly as possible.

The test specimens required for the determination of properties shall be machined from the compression-molded plates according to GB/T 39812, or GB/T 11997 type A multipurpose test specimens moulded according to GB/T 5471-2008.

5 Conditioning of test specimens

Unless otherwise specified, test specimens shall be conditioned as follows before testing the properties listed in Tables 3 and 4.