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

GB/T 1040.4-2026

Replacing GB/T 1040.4-2006

**Plastics - Determination of tensile properties - Part 4: Test
conditions for isotropic and orthotropic fibre-reinforced plastic
composites**

塑料 拉伸性能的测定 第4部分：各向同性和正交各向异性纤维增强复合材料的试
验条件

(English Translation)

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document is Part 4 of GB/T 1040 "Determination of tensile properties of plastics". GB/T 1040 has already published the following parts.

- Part 1: General Provisions;
- Part 2: Test conditions for molded and extruded plastics;
- Part 3: Test conditions for thin films and sheets;
- Part 4: Test conditions for isotropic and orthotropic fiber-reinforced composites;
- Part 5: Test conditions for unidirectional fiber reinforced composites.

This document replaces GB/T 1040.4-2006 "Determination of tensile properties of plastics - Part 4: Isotropic and orthotropic".

The test conditions for fiber-reinforced composite materials, compared with GB/T 1040.4-2006, have undergone major technical changes except for structural adjustments and editorial modifications.

The changes are as follows.

- Added terms and definitions for "thickness", "width", and "failure location" (see 3.2, 3.3, 3.11);
- The term and definition of "sample coordinate axes" have been removed (see 4.8 in the 2006 edition);
- Changed "Shape and Size" (see 6.1, 2006 version 6.1);
- The grading has been changed (see 6.3, 2006 edition of 6.3);
- The "sample quantity" has been changed (see Chapter 7, Chapter 7 of the 2006 edition);

---The "sample size" has been changed (see 9.2, 2006 edition 9.2);

---Added calculation methods for the tensile strength at the failure location of type 4 specimens (see 10.2, Appendix E);

---The preparation methods for Type 2 and Type 3 samples have been added (see Appendix D).

This document is modified to adopt ISO 527-4:2023 "Determination of tensile properties of plastics-Part 4: Isotropic and orthotropic fibers".

Test conditions for 3D reinforced composite materials.

This document has undergone the following structural adjustments compared to ISO 527-4:2023.

---3.6 corresponds to 3.5.1 of ISO 527-4:2023;

---3.7 corresponds to 3.6 in ISO 527-4:2023;

---3.8 corresponds to 3.6.1 of ISO 527-4:2023;

---3.9 corresponds to 3.7 in ISO 527-4:2023;

---3.10 corresponds to 3.8 in ISO 527-4:2023;

---3.11 corresponds to 3.10 of ISO 527-4:2023.

The technical differences between this document and ISO 527-4:2023, and the reasons therefor, are as follows.

---ISO 527-1:2019 has been replaced by the normatively referenced GB/T 1040.1-2025 (see Chapters 4-10 and 12).

GB/T 27797 (all parts) replaces ISO 1268 (all parts) (see 6.2.1), and GB/T 39812 replaces...

ISO 2818 (see 6.2.1 and Annex D) and GB/T 44535-2024 replace ISO 16012:2015 (see Chapter 5 and...).

9.2), to adapt to my country's technological conditions and increase operability;

---The terminology and definition of "sample coordinate axis" (see Figure 1 in 3.5) have been removed, and the content of the sample coordinate axis has been changed to the indexing order in Figure 1.

The explanation and notes are as follows.

The following editorial changes have been made to this document.

---Notes in the range have been removed (see Chapter 1);

---ISO 527 (all parts) has been replaced with GB/T 1040 (all parts) as cited in the

informational reference (see note 2 in 3.1);

---ISO 527-5 has been replaced with GB/T 1040.5 (see note 3 in Figure 1) for informational purposes;

---ISO 527-2 has been replaced by GB/T 1040.2 (see Table 1), which is cited in the informational reference.

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the China Petroleum and Chemical Industry Federation.

This document is under the jurisdiction of the National Technical Committee on Plastics Standardization (SAC/TC15).

Introduction

GB/T 1040, "Determination of Tensile Properties of Plastics," specifies the methods for determining the tensile properties of plastic and composite materials, and proposes five methods.

Partial composition.

---Part 1: General Principles. The purpose is to establish general principles for determining the tensile properties of plastic and composite materials.

---Part 2: Test Conditions for Molded and Extruded Plastics. The purpose is to specify the test conditions for determining the tensile properties of molded and extruded materials.

condition.

---Part 3: Test Conditions for Films and Sheets. The purpose is to specify the tensile strength testing conditions for plastic films or sheets with a thickness less than 1 mm.

Test conditions for elongation properties.

---Part 4: Test conditions for isotropic and orthotropic fiber-reinforced composites. The purpose is to specify the testing conditions for isotropic...

Test conditions for orthotropic fiber-reinforced composite materials.

---Part 5: Test Conditions for Unidirectional Fiber Reinforced Composites. The purpose is to specify the test conditions for unidirectional fiber reinforced composites.

Experimental conditions.

Determination of tensile properties of plastics Part 4: Isotropic and Orthotropic Fibers Test conditions for reinforced composite materials

1 Scope

This document specifies the test conditions required for determining the tensile properties of isotropic and orthotropic fiber-reinforced composite materials.

This document describes the determination of tensile properties of specimens, including tensile strength, tensile modulus, Poisson's ratio, and other properties under specified conditions.

Methods for understanding the stress-strain relationship.

This document applies to the following materials.

---Fiber-reinforced thermosetting and thermoplastic composites incorporating non-unidirectional reinforcing materials, such as felts, machine-made...

Fabrics, untwisted rovings, chopped filaments and compositions of the above-mentioned reinforcing materials, blended fibers, untwisted rovings, chopped or ground fibers Fibers and prepreg materials (prepregs), etc.;

---The above-mentioned composite materials with unidirectional reinforcement and multidirectional reinforced composite materials prepared with balanced symmetrical unidirectional laminated sheets;

---The finished product prepared from the above materials.

This document applies to reinforcing fibers, including glass fiber, carbon fiber, polyaramid fiber, or other similar fibers.

2 Normative references

The contents of the following documents, through normative references within the text, constitute essential provisions of this document. Dated citations are not included.

For references to documents, only the version corresponding to that date applies to this document; for undated references, the latest version (including all amendments) applies.

This document.

GB/T 1040.1-2025 Determination of tensile properties of plastics - Part 1: General (ISO 527-1:2019, MOD) GB/T 27797 (all parts) Method for preparing fiber-reinforced plastic test plates [ISO 1268 (all parts)]

Note 1: GB/T 27797.1-2011 Methods for preparing fiber-reinforced plastic test boards - Part 1: General rules (ISO 1268-1:2001, IDT)

Note 2: GB/T 27797.2-2011 Methods for preparing test plates of fiber-reinforced plastics - Part 2: Contact and spray molding (ISO 1268-2:2001, IDT)