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Replacing GB/T 9341-2000

Plastics - Determination of flexural properties

(ISO 178:2001, IDT)

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Foreword

This Standard is identical with ISO 178:2001 *Plastics - Determination of flexural properties*. This Standard has incorporated, the content of No. 1 Amendment of ISO/TC 61/SC issued in 2004, into the text.

Compared with GB/T 9341-2000, the main changes are as follows:

- Deleted the fiber-reinforced thermosetting and thermoplastic composites, thermotropic liquid crystal polymer in Scope;
- Added the definition of “rigid plastic”;
- Revised the requirements for balance between supports and loading edge;
- Deleted the requirements for some measuring instruments;
- Revised the requirements for non-recommended sample size;
- Added the number of injection sample;
- Stipulated the preferred conditions for state regulation;
- Revised the provisions on corresponding excluding sample;
- Added the requirements for initial stress in test;
- Added the calculation method for flexural strain;
- Added Annex A “Compliance correction”;
- Added Annex B “Precision statement”.

Annex A of this Standard is normative; Annex B is informative.

This Part was proposed by China Petroleum and Chemical Industry Federation.

This Part shall be under the jurisdiction of National Technical Committee on Plastics of Standardization Administration of China (SAC/TC 15).

Main drafting organization of this Standard: Sinopec National Test Center of Polymer & Building Materials.

The drafting organizations of this Standard: Guangzhou Institute of Synthetic Materials Limited, National Quality Supervision and Inspection Center of Synthetic Resin, Beijing Yanshan Petrochemical Resin Institute, National

Plastics - Determination of flexural properties

1 Scope

1.1 This Standard specifies a method for determining the flexural properties of rigid and semi-rigid plastics under defined conditions. A standard test specimen is defined, but parameters are included for alternative specimen sizes for use where appropriate. A range of test speeds is included.

1.2 The method is used to investigate the flexural behavior^[1] of the test specimens and for determining the flexural strength, flexural modulus and other aspects of the flexural stress/strain relationship under the conditions defined. It applies to a freely supported beam, loaded at midspan (three-point loading test).

1.3 The Standard is suitable for use with the following range of materials:

- thermoplastics moulding and extrusion materials, including filled and reinforced compounds in addition to unfilled types; rigid thermoplastics sheets;
- thermosetting moulding materials, including filled and reinforced compounds; thermosetting sheets.

In agreement with GB/T 19467.1-2004^[2] and GB/T 19467.2-2004^[3], this Standard applies to fiber-reinforced compounds with fiber lengths ≤ 7.5 mm prior to processing. For long-fiber-reinforced materials (laminates) with fiber lengths > 7.5 mm, see reference^[4] in the bibliography.

The method is not normally suitable for use with rigid cellular materials and sandwich structures containing cellular material ^[5, 6].

NOTE: For certain types of textile-fiber-reinforced plastics, a four-point bending test is preferred. It is described in reference^[4].

1.4 The method is performed using specimens which may be moulded to the specified dimensions, machined from the central portion of a standard multipurpose test specimen (see GB/T 11997-2008) or machined from finished or semi-finished products such as mouldings, or extruded or cast sheet.

1.5 The method specifies preferred dimensions for the test specimen. Tests which are carried out on specimens of different dimensions, or on specimens which are prepared under different conditions, may produce results which are not comparable. Other factors, such as the test speed and the conditioning of

the specimens, can also influence the results. Especially for semi-crystalline polymers, the thickness of the oriented skin layer, which is dependent on moulding conditions and thickness, affects the flexural properties. Consequently, when comparable data are required, these factors must be carefully controlled and recorded.

1.6 Flexural properties can only be used for engineering design purposes for materials with linear stress/strain behavior. For non-linear behavior, the flexural properties are only nominal. The bending test should preferentially be used with brittle materials, for which tensile tests are difficult.

2 Normative references

The following standards contain the provisions which, through reference in this Standard, constitute the provisions of this Standard. For dated references, subsequent amendments (excluding corrections) or revisions do not apply to this Standard. However, the parties who enter into agreement based on this Standard are encouraged to investigate whether the latest versions of these documents are applicable. For undated reference documents, the latest versions apply to this Standard.

GB/T 2918-1998 *Plastics - Standard atmospheres for conditioning and testing* (idt ISO 291:1997)

GB/T 5471-2008 *Plastics - Compression moulding of test specimens of thermosetting materials* (ISO 295:2004, IDT)

GB/T 9352-2008 *Plastic - Compression moulding of test specimens of thermoplastic materials* (ISO 293:2004, IDT)

GB/T 11997-2008 *Plastic - Multipurpose test specimens* (ISO 37:2002, IDT)

GB/T 17037.1-1997 *Injection moulding of test specimens of thermoplastic materials - Part 1: General principles and moulding of multipurpose and bar test specimens* (idt ISO 294-1:1996)

GB/T 17200-1997 *Technical specification for tensile compression and flexural testing machines for rubber and plastics* (idt ISO 5893:1993)

ISO 2602:1980 *Statistical interpretation of test results - Estimation of the mean - Confidence interval*

ISO 2818:1994 *Plastics - Preparation of test specimens by machining*

ISO 10724-1:1998 *Plastics - Injection moulding of test specimens of thermosetting powder moulding compounds (PMCs) - Part 1: General*

Bibliography

- [1] GB/T 1040.1-2006 *Plastics - Determination of tensile properties - Part 1: General principles* (ISO 527-1:1993, IDT)
- [2] GB/T 19467.1-2004 *Plastics - Acquisition and presentation of comparable single-point data - Part 1:Moulding materials* (ISO 10350-1:1998, MOD)
- [3] GB/T 19467.2-2004 *Plastics - Acquisition and presentation of comparable single-point data - Part 2:Long-fiber-reinforced plastics* (ISO 10350-2:2001, IDT)
- [4] GB/T 1449-2005 *Fiber-reinforced Plastic Composites - Determination of Flexural Properties* (ISO 14125:1998, NEQ)
- [5] GB/T 8812.1-2007 *Rigid cellular plastics - Determination of flexural properties - Part 1: Basic bending test* (ISO 1209-1:2004, IDT)
- [6] GB/T 8812.2-2007 *Rigid cellular plastics - Determination of flexural properties - Part 2:Determination of flexural strength and apparent flexural modulus of elasticity* (ISO 1209-2:2004, IDT)
- [7] GB/T 2035-2008 *Terms and definitions for plastics* (ISO 472:1999, IDT)

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