INTERNATIONAL STANDARD

ISO 11357-3

Third edition
2018-03

Plastics — Differential scanning calorimetry (DSC) —

Part 3: Determination of temperature and enthalpy of melting and crystallization

Plastiques — Analyse calorimétrique différentielle (DSC) —

Partie 3: Détermination de la température et de l'enthalpie de fusion et de cristallisation

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Foreword

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The procedures used to develop this document and those intended for its further maintenance are described in the ISO/IEC Directives, Part 1. In particular the different approval criteria needed for the different types of ISO documents should be noted. This document was drafted in accordance with the editorial rules of the ISO/IEC Directives, Part 2 (see www.iso.org/directives).

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For an explanation on the voluntary nature of standards, the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 5, *Physical-chemical properties*.

This third edition cancels and replaces the second edition (ISO 11357-3:2011), which has been technically revised. The main changes compared to the previous edition are as follows:

— the normative references in Clause 2 have been updated;

— the sample mass is referring to polymer matrix;

— the procedure has been extended to cover materials with wider crystallisation ranges;

— the calculation of heats of transition has been clarified to include computer aided methods.

A list of all parts in the ISO 11357 series can be found on the ISO website.

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Plastics — Differential scanning calorimetry (DSC) —

Part 3: Determination of temperature and enthalpy of melting and crystallization

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Preview

1 Scope

This document specifies a method for the determination of the temperatures and enthalpies of melting and crystallization of crystalline or partially crystalline plastics.

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements 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.

ISO 472, *Plastics — Vocabulary*

ISO 11357-1, *Plastics — Differential scanning calorimetry (DSC) — Part 1: General principles*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 472 and ISO 11357-1 and the following apply.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— IEC Electropedia: available at https://www.electropedia.org/

— ISO Online browsing platform: available at https://www.iso.org/obp

3.1
melting
transition stage between a fully crystalline or partially crystalline solid state and an amorphous liquid of variable viscosity

Note 1 to entry: The transition, also referred to as "fusion", is characterized by an endothermic peak in the DSC curve. An exception to this definition is the case of liquid crystals, where the term "amorphous liquid" is replaced by "ordered liquid".

3.2
crystallization
transition stage between an amorphous liquid state and a fully crystalline or partially crystalline solid state

Note 1 to entry: The transition is characterized by an exothermic peak in the DSC curve. An exception to this definition is the case of liquid crystals, where the term "amorphous liquid" is replaced by "ordered liquid".

3.3
enthalpy of fusion
heat required to melt a material at constant pressure

Note 1 to entry: It is expressed in kilojoules per kilogram (kJ/kg) or joules per gram (J/g).

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3.4
enthalpy of crystallization
heat released by the crystallization of a material at constant pressure

Note 1 to entry: It is expressed in kilojoules per kilogram (kJ/kg) or joules per gram (J/g).

4 Principle

See ISO 11357-1.

5 Apparatus and materials

Apparatus and materials shall be in accordance with ISO 11357-1.

6 Test specimen

The test specimen shall be in accordance with ISO 11357-1.

7 Test conditions and specimen conditioning

The test conditions and specimen conditioning shall be in accordance with ISO 11357-1.

8 Calibration

Calibration shall be in accordance with ISO 11357-1.

9 Procedure

9.1 Setting up the apparatus

The setting up of the apparatus shall be in accordance with ISO 11357-1.

9.2 Loading the test specimen into the crucible

The loading of the test specimen shall be in accordance with ISO 11357-1.

Unless otherwise specified in the material standard, preferably use a mass of 5 mg to 10 mg for the measurement. In the case of high or low heats of transition, masses lower or higher than 5 mg to 10 mg, respectively, may be used. In case of polymer compounds the mass shall refer to the matrix polymer.

9.3 Insertion of crucibles

The insertion shall be in accordance with ISO 11357-1.

9.4 Temperature scan

9.4.1 Heating and cooling rates other than those recommended here may be used by agreement between the interested parties. In particular, high scanning rates result in larger effects of the recorded transition. On the other hand, low scanning rates provide higher resolution in temperature and may be appropriate in the resolution of closely overlapping transitions.

9.4.2 Allow 5 min for a nitrogen pre-purge prior to beginning the heating cycle.

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