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**Plastics — Differential scanning  
calorimetry (DSC) —**

**Part 7:  
Determination of crystallization  
kinetics**

*Plastiques — Analyse calorimétrique différentielle (DSC) —*

*Partie 7: Détermination de la cinétique de cristallisation*



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# Contents

Page

<b>Foreword</b> .....	<b>iv</b>
<b>1 Scope</b> .....	<b>1</b>
<b>2 Normative references</b> .....	<b>1</b>
<b>3 Terms and definitions</b> .....	<b>1</b>
<b>4 Principle</b> .....	<b>2</b>
<b>5 Apparatus and materials</b> .....	<b>2</b>
<b>6 Test specimens</b> .....	<b>2</b>
<b>7 Test conditions and specimen conditioning</b> .....	<b>2</b>
<b>8 Calibration</b> .....	<b>2</b>
<b>9 Procedure</b> .....	<b>2</b>
9.1 General.....	2
9.2 Loading the test specimen into the crucible.....	3
9.3 Insertion of the crucibles into the instrument.....	3
9.4 Melting of the polymer.....	3
9.5 Isothermal crystallization.....	3
9.6 Non-isothermal crystallization.....	4
<b>10 Expression of results</b> .....	<b>5</b>
10.1 General.....	5
10.2 Methods of determination of crystallization kinetics.....	5
10.2.1 Isothermal crystallization.....	5
10.2.2 Non-isothermal crystallization.....	7
<b>11 Precision</b> .....	<b>8</b>
<b>12 Test report</b> .....	<b>8</b>
<b>Annex A (informative) Equations for crystallization kinetics of polymers</b> .....	<b>9</b>
<b>Bibliography</b> .....	<b>11</b>

## Foreword

ISO (the International Organization for Standardization) is a worldwide federation of national standards bodies (ISO member bodies). The work of preparing International Standards is normally carried out through ISO technical committees. Each member body interested in a subject for which a technical committee has been established has the right to be represented on that committee. International organizations, governmental and non-governmental, in liaison with ISO, also take part in the work. ISO collaborates closely with the International Electrotechnical Commission (IEC) on all matters of electrotechnical standardization.

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](http://www.iso.org/directives)).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see [www.iso.org/patents](http://www.iso.org/patents)).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the WTO principles in the Technical Barriers to Trade (TBT) see the following URL: [Foreword - Supplementary information](#).

The committee responsible for this document is ISO/TC 61, *Plastics*, Subcommittee SC 5, *Physical-chemical properties*.

This second edition cancels and replaces the first edition (ISO 11357-7:2002), which has been technically revised with the following changes:

- a) values to be recorded for isothermal crystallization revised, starting time of the isothermal step ( $t = 0$ ) added (10.2.1), and Figure 2 to Figure 6 revised accordingly;
- b) Formula (A.1) and Formula (A.2) are corrected;
- c) dated references changed to undated references.

ISO 11357 consists of the following parts, under the general title *Plastics — Differential scanning calorimetry (DSC)*:

- Part 1: General principles
- Part 2: Determination of glass transition temperature and glass transition step height
- Part 3: Determination of temperature and enthalpy of melting and crystallization
- Part 4: Determination of specific heat capacity
- Part 5: Determination of characteristic reaction-curve temperatures and times, enthalpy of reaction and degree of conversion
- Part 6: Determination of oxidation induction time (isothermal OIT) and oxidation induction temperature (dynamic OIT)
- Part 7: Determination of crystallization kinetics

# Plastics — Differential scanning calorimetry (DSC) —

## Part 7:

## Determination of crystallization kinetics

### 1 Scope

This part of ISO 11357 specifies two methods (isothermal and non-isothermal) for studying the crystallization kinetics of partially crystalline polymers using differential scanning calorimetry (DSC).

It is only applicable to molten polymers.

NOTE These methods are not suitable if the molecular structure of the polymer is modified during the test.

### 2 Normative references

The following documents, in whole or in part, are normatively referenced in this document and are indispensable for its application. 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*

ISO 11357-3, *Plastics — Differential scanning calorimetry (DSC) — Part 3: Determination of temperature and enthalpy of melting and crystallization*

### 3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 472, ISO 11357-1, ISO 11357-3, and the following apply.

#### 3.1

##### crystallization kinetics

description of the rate of crystallization of a material taking into account the effects of variables such as time, temperature, pressure, stress, and molecular structure

Note 1 to entry: These factors and also any additives, fillers, or contaminants can modify the crystallinity of the polymer at the end of crystallization.

#### 3.2

##### relative crystallinity

$\alpha$

ratio between the crystallinity at a particular point in time or a particular temperature and the crystallinity at the end of crystallization

Note 1 to entry: The relative crystallinity can be expressed either as a ratio or as a percentage if multiplied by 100.

Note 2 to entry: In DSC, the relative crystallinity can be determined as the ratio between the partial area of the crystallization peak, at each time or each temperature, and the total area of the peak.