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Plastics — Temperature modulated DSC —

Part 1: General principles

Plastiques — DSC à température modulée —

Partie 1: Principes généraux

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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).

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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*.

A list of all parts in the ISO 19935 series can be found on the ISO website.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

The ISO 19935 series specifies temperature modulated differential scanning calorimetry (DSC) methods for the thermal analysis of polymers such as thermoplastics, thermosets and elastomers.

It is designed for observing and quantifying various phenomena or properties of the abovementioned materials such as

— physical transitions (glass transition, phase transitions like melting, crystallization, and cold crystallization, etc.);

— chemical reactions (cross-linking and curing of elastomers and thermosets, etc.);

— heat capacity;

— separation of overlapping thermal transitions.

This document describes the realization of several standardized thermoanalytical test methods which can be used for the determination of comparable data needed for data sheets or databases as well as for research purposes, but it can also be applied to quality assurance or to routine checks of raw materials and finished products, if desired. The procedures mentioned in this document apply as long as special product standards or standards describing special atmospheres for conditioning of samples do not require alternate provisions.

For scientific investigations or resolution of special analytical problems, all technical capabilities of the instruments beyond the provisions of this document may be used.

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Plastics — Temperature modulated DSC —

Part 1: General principles

1 Scope

This document establishes general principles of temperature modulated differential scanning calorimetry (DSC) such as description of the principle and the apparatus, sampling, calibration and general aspects of the procedure and test report common to all parts of the ISO 19335 series.

NOTE Details on performing specific methods are intended to be given in the future parts of the ISO 19335 series.

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*

ISO 80000-5, *Quantities and units — Part 5: Thermodynamics*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 472, ISO 11357-1 and ISO 80000-5 apply.

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

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

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

4 Calculation of heat flow rate and heat capacity

4.1 Temperature modulation, *T(t)*

A periodic temperature profile superimposed to a linear temperature change or constant temperature, is given by Formula (1):

$$T(t) = T_0 + \beta_0 \cdot t + T_A \cdot f(t) \tag{1}$$

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