
**Plastics — Thermomechanical
analysis (TMA) —**

**Part 1:
General principles**

Plastiques — Analyse thermomécanique (TMA) —

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).

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).

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 11359-1:1999), which has been technically revised with the following changes:

- clarification that deformations shall occur under constant load;
- inclusion of reference to ISO 472 in Definitions and cancellation of duplicate and trivial definitions;
- revision of apparatus requirements following guidelines specified in ISO 11357-1 and update of accuracy specifications;
- revision of specification of temperature calibration;
- revision of specification of displacement and sample length measurement.

ISO 11359 consists of the following parts, under the general title *Plastics — Thermomechanical analysis (TMA)*:

- *Part 1: General principles*
- *Part 2: Determination of coefficient of linear thermal expansion and glass transition temperature*
- *Part 3: Determination of penetration temperature*

Plastics — Thermomechanical analysis (TMA) —

Part 1: General principles

1 Scope

This part of ISO 11359 specifies the general conditions for the thermomechanical analysis of thermoplastics and thermosetting materials, filled or unfilled, in the form of sheet or moulded parts.

Thermomechanical analysis consists of the determination of deformations of a test specimen under constant load as a function of temperature and/or time.

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 291, *Plastics — Standard atmospheres for conditioning and testing*

ISO 472, *Plastics — Vocabulary*

ISO 11359-2, *Plastics — Thermomechanical analysis (TMA) — Part 2: Determination of coefficient of linear thermal expansion and glass transition temperature*

ISO 11359-3, *Plastics — Thermomechanical analysis (TMA) — Part 3: Determination of penetration temperature*

3 Terms and definitions

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

3.1

thermodilatometry

technique in which one dimension (or the volume) of a substance under negligible constant stress is measured as a function of temperature while the substance is subjected to a controlled temperature programme

Note 1 to entry: A distinction is made between linear thermodilatometry (in which one dimension is measured) and volume thermodilatometry (in which the volume is measured).

4 Principle

The deformation of a material under constant stress is measured as a function of time at a constant temperature or as a function of temperature.

5 Apparatus

The components of a basic thermomechanical analyser consist of the following:

5.1 Temperature-programmable furnace, capable of: