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

Part 2:

**Determination of coefficient of
linear thermal expansion and glass
transition temperature**

Plastiques — Analyse thermomécanique (TMA) —

*Partie 2: Détermination du coefficient de dilatation thermique
linéique et de la température de transition vitreuse*



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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 of 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 www.iso.org/iso/foreword.html.

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

This second edition cancels and replaces the first edition (ISO 11359-2:1999), which has been technically revised.

The main changes compared to the previous edition are as follows:

- the testing procedure has been revised with regard to test load and purge gas conditions;
- the evaluation of determination of the mean coefficient of thermal expansion with reference specimen has been specified more precisely;
- the document has been editorially revised.

A list of all parts in the ISO 11359 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.

Plastics — Thermomechanical analysis (TMA) —

Part 2:

Determination of coefficient of linear thermal expansion and glass transition temperature

1 Scope

This document specifies a test method, using thermodilatometry^[1], for the determination of the coefficient of linear thermal expansion of plastics in a solid state by thermomechanical analysis (TMA). This document also specifies the determination of the glass transition temperature using TMA.

NOTE The coefficient of linear thermal expansion can be measured using various types of thermodilatometry apparatus. This document concerns only TMA apparatus.

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

ISO 472, *Plastics — Vocabulary*

ISO 11359-1, *Plastics — Thermomechanical analysis (TMA) — Part 1: General principles*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 472, ISO 11359-1 and the following 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 <https://www.electropedia.org/>

3.1 differential coefficient of linear thermal expansion

α
expansion, normalised to the reference length L_0 at room temperature, for any of the three dimensions at temperature T and at constant pressure p , given in reciprocal kelvins, by the following formula:

$$\alpha = \frac{(dL)_p}{(dT)_p} \times \frac{1}{L_0} = \frac{(dL/dt)_p}{(dT/dt)_p} \times \frac{1}{L_0}$$

where

- L_0 is the reference length at room temperature T_0 , in the axis of measurement;
- L is the length at temperature T , in the axis of measurement;