INTERNATIONAL STANDARD

ISO 75-1

Fourth edition
2020-02

Plastics — Determination of temperature of deflection under load —

Part 1: General test method

Plastiques — Détermination de la température de fléchissement sous charge —

Partie 1: Méthode d'essai générale

Reference number
ISO 75-1:2020(E)

ISO copyright office
CP 401 • Ch. de Blandonnet 8
CH-1214 Vernier, Geneva
Phone: +41 22 749 01 11
Fax: +41 22 749 09 47
Email: copyright@iso.org
Website: www.iso.org

Published in Switzerland

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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 2, *Mechanical behavior*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 249, *Plastics*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 75-1:2013), which has been technically revised. The main changes compared to the previous edition are as follows:

— specification for the temperature difference between the middle and the ends of the test specimens has been removed;

— specification for the position of the tip of the temperature sensor has been widened;

— editorial changes have been applied.

A list of all parts in the ISO 75 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 — Determination of temperature of deflection under load —

Part 1: General test method

1 Scope

1.1 This document gives a general test method for the determination of the temperature of deflection under load (flexural stress under three-point loading) of plastics. Different types of test specimen and different constant loads are defined to suit different types of material.

1.2 ISO 75-2 gives specific requirements for plastics (including filled plastics and fibre-reinforced plastics in which the fibre length, prior to processing, is up to 7,5 mm) and ebonite, while ISO 75-3 gives specific requirements for high-strength thermosetting laminates and long-fibre-reinforced plastics in which the fibre length, prior to processing, is greater than 7,5 mm.

1.3 The methods specified are suitable for assessing the relative behaviour of different types of material at elevated temperature under load at a specified rate of temperature increase. The results obtained do not necessarily represent maximum applicable temperatures because, in practice, essential factors, such as time, loading conditions and nominal surface stress, can differ from the test conditions. True comparability of data can only be achieved for materials having the same room-temperature flexural modulus.

1.4 The methods specify preferred dimensions for the test specimens.

1.5 Data obtained using the test methods described are not intended to be used to predict actual end-use performance. The data are not intended for design analysis or prediction of the endurance of materials at elevated temperatures.

1.6 This method is commonly known as the heat deflection temperature or heat distortion temperature (HDT) test, although there is no official document using this designation.

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 75-2, *Plastics — Determination of temperature of deflection under load — Part 2: Plastics and ebonite*

ISO 75-3, *Plastics — Determination of temperature of deflection under load — Part 3: High-strength thermosetting laminates and long-fibre-reinforced plastics*

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

ISO 16012, *Plastics — Determination of linear dimensions of test specimens*

IEC 60584-1, *Thermocouples — Part 1: EMF specifications and tolerances*

IEC 60751, *Industrial platinum resistance thermometers and platinum temperature sensors*

3 Terms and definitions

For the purposes of this document, the following terms and definitions 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/

3.1
flexural strain
ε_f
nominal fractional change in length of an element of the outer surface of the test specimen at midspan

Note 1 to entry: It is expressed as a dimensionless ratio or a percentage (%).

3.2
flexural strain increase
$\Delta\varepsilon_f$
specified increase in *flexural strain* (3.1) that takes place during heating

Note 1 to entry: It is expressed as a percentage (%).

3.3
deflection
s
distance over which the top or bottom surface of the test specimen at midspan deviates during flexure from its original position

Note 1 to entry: It is expressed in millimetres (mm).

3.4
standard deflection
Δs
increase in *deflection* (3.3) corresponding to the *flexural strain increase* (3.2), $\Delta\varepsilon_f$, at the surface of the test specimen, and which is specified in ISO 75-2 or ISO 75-3

Note 1 to entry: It is expressed in millimetres (mm). See Formula (4).

3.5
flexural stress
σ_f
nominal stress at the outer surface of the test specimen at midspan

Note 1 to entry: It is expressed in megapascals (MPa).

3.6
load
F
force, applied to the test specimen at midspan, which results in a defined *flexural stress* (3.5)

Note 1 to entry: It is expressed in newtons (N). See Formulae (1) to (3).

3.7
temperature of deflection under load
T_f
temperature at which the *deflection* (3.3) of the test specimen reaches the *standard deflection* (3.4) as the temperature is increased

Note 1 to entry: It is expressed in degrees Celsius (°C).