



International
Standard

ISO 899-2

**Plastics — Determination of creep
behaviour —**

**Part 2:
Flexural creep by three-point loading**

*Plastiques — Détermination du comportement au fluage —
Partie 2: Fluage en flexion par mise en charge en trois points*

**Third edition
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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 document 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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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 third edition cancels and replaces the second edition (ISO 899-2:2003), which has been technically revised. It also incorporates the Amendment ISO ISO 899-2:2003/Amd. 1:2015.

The main changes are as follows:

- the accuracy requirements for the deflection measurement device have been updated;
- the normative references have been updated;
- the definition of "creep" has been adapted for clarity;
- the definitions for shape and dimensions of test specimens were adapted from ISO 178:2019;
- identified inconsistencies and mistakes have been corrected.

A list of all parts in the ISO 899 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 creep behaviour —

Part 2: Flexural creep by three-point loading

1 Scope

1.1 This document specifies a method for determining the flexural creep of plastics in the form of standard test specimens under specified conditions such as those of pre-treatment, temperature and humidity. It is only applicable to a simple freely supported beam loaded at mid-span (three-point-loading test).

1.2 The method is suitable for use with rigid and semi-rigid non-reinforced, filled and fibre-reinforced plastics materials (see ISO 472 for definitions) test specimens moulded directly or machined from sheets or moulded articles.

NOTE The method can be unsuitable for certain fibre-reinforced materials due to differences in fibre orientation.

1.3 The method is intended to provide data for engineering-design, quality control, research and development purposes.

1.4 The method might not be applicable for determining the flexural creep of rigid cellular plastics (attention is drawn in this respect to ISO 1209-1 and ISO 1209-2).

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 178, *Plastics — Determination of flexural properties*

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

ISO 472, *Plastics — Vocabulary*

ISO 9513, *Metallic materials — Calibration of extensometer systems used in uniaxial testing*

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

3 Terms and definitions

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

ISO and IEC maintain terminology 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
creep

increase in strain with time under constant force, measured from the first moment when the loading of the specimen started

3.2
load

force applied to the test specimen at mid-span

Note 1 to entry: It is expressed in Newtons

3.3
flexural stress

σ
surface stress in the mid-span section of the test specimen

Note 1 to entry: It is expressed in megapascals.

Note 2 to entry: It is calculated from the relationship given in [7.1.3](#)

3.4
deflection

s_t
distance over which the top or bottom surface of the test specimen at mid-span deviates from its unloaded original position during flexure

Note 1 to entry: It is expressed in millimetres.

3.5
flexural-creep strain

ε_t
strain at the surface of the test specimen produced by a stress at any given time t during a creep test

Note 1 to entry: It is calculated according to [7.1.4](#).

Note 2 to entry: It is expressed as a dimensionless ratio or as a percentage.

3.6
flexural-creep modulus

E_t
ratio of flexural stress to flexural-creep strain

Note 1 to entry: It is calculated as in [7.1.1](#).

Note 2 to entry: It is expressed in megapascals.

3.7
flexural-creep compliance

D_t
ratio of flexural-creep strain to flexural stress

Note 1 to entry: It is calculated as in [7.1.2](#).

Note 2 to entry: It is expressed in gigapascals⁻¹

3.8
isochronous stress-strain curve

Cartesian plot of stress versus creep strain, at a specific time after application of the load to the specimen

3.9
time to rupture

period of time the specimen is under full load until rupture

3.10

creep-strength limit

initial stress which will just cause rupture ($\sigma_{B,t}$) or will produce a specified strain ($\sigma_{\varepsilon,t}$) at a specified time t , at a given temperature and relative humidity

Note 1 to entry: It is expressed in megapascals.

3.11

initial distance between specimen supports span

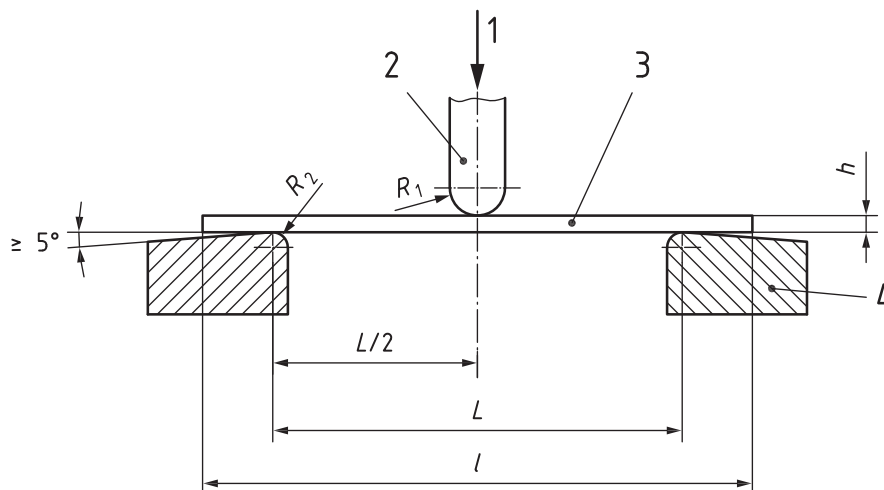
L

initial distance between lines of contact between test specimen and supports (see [Figure 1](#))

Note 1 to entry: It is expressed in millimetres.

4 Apparatus

4.1 Test rack, comprising a rigid frame with two supports, one for each end of the test specimen, the distance between the supports being adjustable to (16 ± 1) times the thickness (height) of the specimen (see [Figure 1](#)) for normal specimens, or to greater than 17 times the thickness (height) of the specimen or a fixed distance (100 mm) for rigid unidirectional-fibre-reinforced test specimens (see [6.3](#)). The test rack shall be levelled, and sufficient space shall be allowed below the specimen for the specimen to flex under constant loading at mid-span.



Key

1	applied force, F	L	initial distance between specimen supports
2	loading edge	l	specimen length
3	test specimen	h	specimen thickness
4	support	R_1	radius of the loading edge
		R_2	radius of the supports

Figure 1 — Characteristics of flexural-creep apparatus

The radius R_1 of the loading edge and the radius R_2 of the supports shall conform to the values given in [Table 1](#).