

This is a preview of "BS EN ISO 178:2019". [Click here to purchase the full version from the ANSI store.](#)



BSI Standards Publication

Plastics - Determination of flexural properties

This is a preview of "BS EN ISO 178:2019". [Click here to purchase the full version from the ANSI store.](#)

National foreword

This British Standard is the UK implementation of EN ISO 178:2019. It is identical to ISO 178:2019. It supersedes BS EN ISO 178:2010+A1:2013, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PRI/21, Testing of plastics.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

© The British Standards Institution 2019
Published by BSI Standards Limited 2019

ISBN 978 0 580 92959 5

ICS 83.080.01

Compliance with a British Standard cannot confer immunity from legal obligations.

This British Standard was published under the authority of the Standards Policy and Strategy Committee on 31 May 2019.

Amendments/corrigenda issued since publication

Date	Text affected
------	---------------

This is a preview of "BS EN ISO 178:2019". [Click here to purchase the full version from the ANSI store.](#)

EUROPÄISCHE NORM

May 2019

ICS 83.080.01

Supersedes EN ISO 178:2010

English Version

Plastics - Determination of flexural properties (ISO 178:2019)

Plastiques - Détermination des propriétés
en flexion (ISO 178:2019)

Kunststoffe - Bestimmung der
Biegeeigenschaften (ISO 178:2019)

This European Standard was approved by CEN on 23 March 2019.

CEN members are bound to comply with the CEN/CENELEC Internal Regulations which stipulate the conditions for giving this European Standard the status of a national standard without any alteration. Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the CEN-CENELEC Management Centre or to any CEN member.

This European Standard exists in three official versions (English, French, German). A version in any other language made by translation under the responsibility of a CEN member into its own language and notified to the CEN-CENELEC Management Centre has the same status as the official versions.

CEN members are the national standards bodies of Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Republic of North Macedonia, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and United Kingdom.



EUROPEAN COMMITTEE FOR STANDARDIZATION
COMITÉ EUROPÉEN DE NORMALISATION
EUROPÄISCHES KOMITEE FÜR NORMUNG

CEN-CENELEC Management Centre: Avenue Marnix 17, B-1000 Brussels

This is a preview of "BS EN ISO 178:2019". [Click here to purchase the full version from the ANSI store.](#)

European foreword

This document (EN ISO 178:2019) has been prepared by Technical Committee ISO/TC 61 "Plastics" in collaboration with Technical Committee CEN/TC 249 "Plastics" the secretariat of which is held by NBN.

This European Standard shall be given the status of a national standard, either by publication of an identical text or by endorsement, at the latest by November 2019, and conflicting national standards shall be withdrawn at the latest by November 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 178:2010.

According to the CEN-CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Bulgaria, Croatia, Cyprus, Czech Republic, Denmark, Estonia, Finland, Former Yugoslav Republic of Macedonia, France, Germany, Greece, Hungary, Iceland, Ireland, Italy, Latvia, Lithuania, Luxembourg, Malta, Netherlands, Norway, Poland, Portugal, Romania, Serbia, Slovakia, Slovenia, Spain, Sweden, Switzerland, Turkey and the United Kingdom.

Endorsement notice

The text of ISO 178:2019 has been approved by CEN as EN ISO 178:2019 without any modification.

This is a preview of "BS EN ISO 178:2019". [Click here to purchase the full version from the ANSI store.](#)

Contents

Page

Foreword	iv
1 Scope	1
2 Normative references	1
3 Terms, definitions and symbols	2
4 Principle	5
5 Test machine	5
5.1 General.....	5
5.2 Test speed.....	6
5.3 Supports and loading edge.....	6
5.4 Force- and deflection-measuring systems.....	6
5.4.1 Introductory remarks.....	6
5.4.2 Definition of precision and accuracy requirements.....	6
5.4.3 Deflection measurement.....	8
5.5 Equipment for measuring the width and thickness of the test specimens.....	9
6 Test specimens	9
6.1 Shape and dimensions.....	9
6.1.1 General.....	9
6.1.2 Preferred specimen type.....	9
6.1.3 Other test specimens.....	10
6.2 Anisotropic materials.....	10
6.3 Preparation of test specimens.....	11
6.3.1 From moulding, extrusion and casting compounds.....	11
6.3.2 From sheets.....	11
6.4 Specimen inspection.....	11
6.5 Number of test specimens.....	12
7 Atmosphere for conditioning and testing	12
8 Procedure	12
9 Calculation and expression of results	15
9.1 Flexural stress.....	15
9.2 Flexural strain.....	16
9.3 Flexural modulus.....	16
9.4 Statistical parameters.....	17
9.5 Significant figures.....	17
10 Precision	17
11 Test report	17
Annex A (informative) Precision statement	18
Annex B (informative) Influence of changes in test speed on the measured values of flexural properties	20
Annex C (normative) Compliance correction for Type III-tests	21
Annex D (informative) Relation between tensile and flexural modulus: Theoretical expectations and experimental observations	23
Bibliography	24

This is a preview of "BS EN ISO 178:2019". [Click here to purchase the full version from the ANSI store.](#)

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 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 ISO/TC 61, *Plastics*, Subcommittee SC 2, *Mechanical properties*.

This sixth edition cancels and replaces the fifth edition (ISO 178:2010), which has been technically revised. It also incorporates the Amendment ISO 178:2010/Amd.1:2013. The main changes compared to the previous edition are as follows:

- differentiating calibration requirements according to the type of test;
- the introduction of deflectometers;
- the reinstatement of procedures for compliance correction;
- the addition of a new [Annex D](#) showing the relation between tensile and flexural modulus.

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.

This is a preview of "BS EN ISO 178:2019". [Click here to purchase the full version from the ANSI store.](#)

Plastics - Determination of flexural properties

1 Scope

This document specifies a method for determining the flexural properties of rigid and semi-rigid plastics under defined conditions. A preferred test specimen is defined, but parameters are included for alternative specimen sizes for use where appropriate. A range of test speeds is included.

The method is used to investigate the flexural behaviour of the test specimens and to determine the flexural strength, flexural modulus and other aspects of the flexural stress/strain relationship under the conditions defined. It applies to a freely supported beam, loaded at midspan (three-point loading test).

The method is suitable for use with the following range of materials:

- thermoplastic moulding, extrusion and casting materials, including filled and reinforced compounds in addition to unfilled types; rigid thermoplastics sheets;
- thermosetting moulding materials, including filled and reinforced compounds; thermosetting sheets.

In agreement with ISO 10350-1^[5] and ISO 10350-2^[6], this document applies to fibre-reinforced compounds with fibre lengths $\leq 7,5$ mm prior to processing. For long-fibre-reinforced materials (laminates) with fibre lengths $> 7,5$ mm, see ISO 14125^[7].

The method is not normally suitable for use with rigid cellular materials or sandwich structures containing cellular material. In such cases, ISO 1209-1^[3] and/or ISO 1209-2^[4] can be used.

NOTE 1 For certain types of textile-fibre-reinforced plastic, a four-point bending test is used. This is described in ISO 14125.

The method is performed using specimens which can be either moulded to the specified dimensions, machined from the central section of a standard multipurpose test specimen (see ISO 20753) or machined from finished or semi-finished products, such as mouldings, laminates, or extruded or cast sheet.

The method specifies the preferred dimensions for the test specimen. Tests which are carried out on specimens of different dimensions, or on specimens which are prepared under different conditions, can produce results which are not comparable. Other factors, such as the test speed and the conditioning of the specimens, can also influence the results.

NOTE 2 Especially for injection moulded semi-crystalline polymers, the thickness of the oriented skin layer, which is dependent on the moulding conditions, also affects the flexural properties.

The method is not suitable for the determination of design parameters but can be used in materials testing and as a quality control test.

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 293, *Plastics — Compression moulding of test specimens of thermoplastic materials*