BS EN ISO 179-2:2020

BSI Standards Publication

Plastics – Determination of Charpy impact properties

Part 2: Instrumented impact test

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National foreword

This British Standard is the UK implementation of EN ISO 179-2:2020. It is identical to ISO 179-2:2020. It supersedes BS EN ISO 179-2:1999+A1:2012, which is withdrawn.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.

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European foreword

This document (EN ISO 179-2:2020) 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of an identical text or by endorsement, at the latest by December 2020, and conflicting national standards shall be withdrawn at the latest by December 2020.

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 179-2:1999.

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Endorsement notice

The text of ISO 179-2:2020 has been approved by CEN as EN ISO 179-2:2020 without any modification.

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Document Sharing Hub

Full document details: BS EN ISO 179-2:2020

Contents

Page

Foreword ..... **iv**
1 Scope **1**
2 Normative references **2**
3 Terms and definitions **2**
4 Principle **7**
5 Apparatus **7**
6 Test specimens **11**
7 Procedure **11**
8 Calculation and expression of results **12**
8.1 General 12
8.2 Calculation of deflection 12
8.3 Calculation of energy 13
8.4 Calculation of impact strength 14
8.4.1 Unnotched test specimens 14
8.4.2 Notched test specimens 14
8.5 Statistical parameters 15
8.6 Number of significant figures 15
9 Precision **15**
10 Test report **15**
Annex A (informative) **Inertial peak** **17**
Annex B (informative) **Mass of frame** **20**
Annex C (informative) **Precision data** **21**
Bibliography **23**

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Document Sharing Hub
Full document details: BS EN ISO 179-2:2020

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).

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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 Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 2, *Mechanical properties*, 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 second edition cancels and replaces the first edition (ISO 179-2:1997), which has been technically revised. It also incorporates the Technical Corrigendum ISO 179-2:1997/Cor 1:1998 and the Amendment ISO 179-2:1997/Amd 1:2011.

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

— references to ISO 13802:2015 have been updated;

— force calibration requirements have been clarified;

— a new subclause for the determination of test speed when using falling mass instruments has been added (see 5.1.6).

A list of all parts of the ISO 179 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.

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Plastics — Determination of Charpy impact properties —

Part 2:
Instrumented impact test

1 Scope

1.1 This document specifies a method for determining Charpy impact properties of plastics from force-deflection diagrams. Different types of rod-shaped test specimens and test configurations, as well as test parameters depending on the type of material, the type of test specimen and the type of notch, are defined in ISO 179-1.

Dynamic effects such as load-cell/striker resonance, test specimen resonance and initial-contact/inertia peaks are described in this document (see Figure 1, Curve b, and Annex A).

1.2 ISO 179-1 is suitable for characterizing the impact behaviour by the impact strength only and for using apparatus whose potential energy is matched approximately to the particular energy to break to be measured (see ISO 13802:2015, Annex E). This document is used to record a force-deflection or force-time diagram for detailed characterization of the impact behaviour, and for developing automatic apparatus, i.e. avoiding the need to match energy.

The method described in this document is also suitable for:

— acquiring more and different materials characteristics under impact conditions;

— supervising the Charpy test procedure, as this instrumentation allows detection of typical operational mistakes, such as the specimen not being in close contact with the supports;

— automatically detecting the type of break;

— pendulum type instruments to avoid frequent changes of pendulum hammers;

— measuring fracture mechanical properties described in other ISO standards.

1.3 For the range of materials which can be tested by this method, see ISO 179-1:2010, Clause 1.

1.4 For the general comparability of test results, see ISO 179-1:2010, Clause 1.

1.5 Information on the typical behaviour of materials can be obtained by testing at different temperatures, by varying the notch radius and/or specimen thickness and by testing specimens prepared under different conditions.

It is not the purpose of this document to give an interpretation of the mechanism occurring at every point on the force-deflection diagram. These interpretations are a task for on-going scientific research.

1.6 The test results obtained with this method are comparable only if the conditions of test specimen preparation, as well as the test conditions, are the same. The impact behaviour of finished products cannot, therefore, be predicted directly from this test.

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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 179-1:2010, *Plastics — Determination of Charpy impact properties — Part 1: Non-instrumented impact test*

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

ISO 2602, *Statistical interpretation of test results — Estimation of the mean — Confidence interval*

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

ISO 13802:2015, *Plastics — Verification of pendulum impact-testing machines — Charpy, Izod and tensile impact-testing*

3 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 179-1 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 http://www.electropedia.org/

3.1
impact velocity
v_I
velocity of the striker relative to the test specimen supports at the moment of impact

Note 1 to entry: It is expressed in metres per second (m/s).

3.2
inertial peak
first peak in a force-time or force-deflection diagram

Note 1 to entry: Inertial peak arises from the inertia of that part of the test specimen accelerated after the first contact with the striker (see Figure 1, Curve b, and Annex A).

3.3
impact force
F
force exerted by the striking edge on the test specimen in the direction of impact

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

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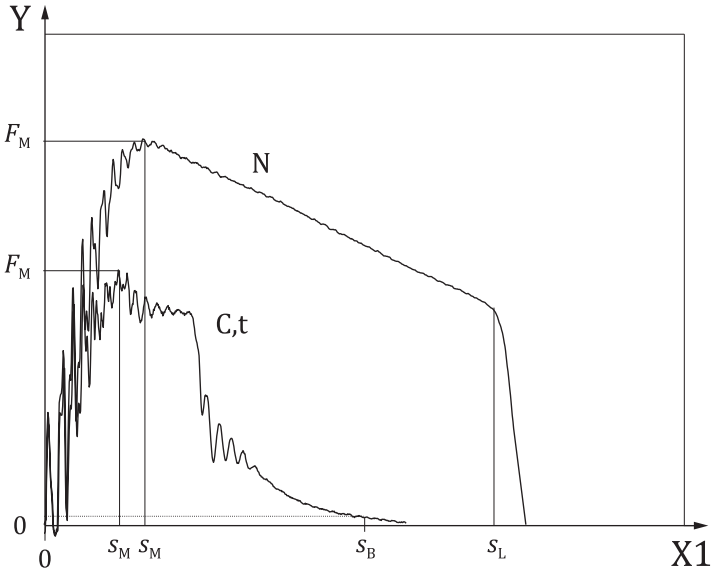
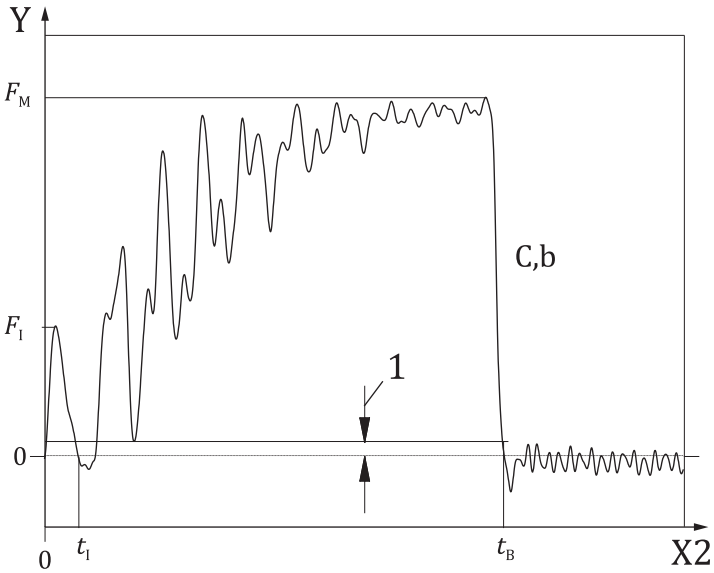


a) Force-deflection (N and C,t)



b) Force-time (C,b)

Key

X1	deflection (s) after impact in millimetres	t_B	time at break
X2	time after impact in milliseconds, ms	s_B	deflection at break
Y	force (F) in newtons, N	N	no break, specimen pulled through
F_M	maximum impact force	C,t	complete break, tough
F_I	peak force of inertial peak	C,b	complete break, brittle
s_M	deflection at maximum impact force F_M	1	5% of the maximum impact force
s_L	limiting deflection, beginning off pull-through		

NOTE For the types of failure, see Figure 2.

Figure 1 — Typical force-deflection and force-time curves

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