

Plastics - Determination of puncture impact behaviour
of rigid plastics - Part 2: Instrumented impact testing
(ISO 6603-2:2023)

EESTI STANDARDI EESSÕNA

NATIONAL FOREWORD

See Eesti standard EVS-EN ISO 6603-2:2023 sisaldab Euroopa standardi EN ISO 6603-2:2023 ingliskeelset teksti.	This Estonian standard EVS-EN ISO 6603-2:2023 consists of the English text of the European standard EN ISO 6603-2:2023.
Standard on jõustunud sellekohase teate avaldamisega EVS Teatajas.	This standard has been endorsed with a notification published in the official bulletin of the Estonian Centre for Standardisation and Accreditation.
Euroopa standardimisorganisatsioonid on teinud Euroopa standardi rahvuslikele liikmetele kättesaadavaks 14.06.2023.	Date of Availability of the European standard is 14.06.2023.
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ICS 83.080.01

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English Version

Plastics - Determination of puncture impact behaviour of
rigid plastics - Part 2: Instrumented impact testing (ISO
6603-2:2023)

Plastiques - Détermination du comportement des
plastiques rigides perforés sous l'effet d'un choc -
Partie 2: Essais de choc instrumentés (ISO 6603-
2:2023)

Kunststoffe - Bestimmung des Durchstoßverhaltens
von festen Kunststoffen - Teil 2: Instrumentierter
Schlagversuch (ISO 6603-2:2023)

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

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European foreword

This document (EN ISO 6603-2:2023) 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 SIS.

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of an identical text or by endorsement, at the latest by December 2023, and conflicting national standards shall be withdrawn at the latest by December 2023.

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 6603-2:2000.

Any feedback and questions on this document should be directed to the users' national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

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, 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, Türkiye and the United Kingdom.

Endorsement notice

The text of ISO 6603-2:2023 has been approved by CEN as EN ISO 6603-2:2023 without any modification.

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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 6603-2:2000), which has been technically revised.

The main changes are as follows:

- references to ISO 6603-1 were replaced by the corresponding text;
- normative references and bibliography were updated and completed;
- requirements for force measurement accuracy were revised;
- definitions for conditioning and test climate were updated;
- testing in a clamped situation were defined as the preferred method;
- precision data was added to [Annex G](#).

A list of all parts in the ISO 6603 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 puncture impact behaviour of rigid plastics —

Part 2: Instrumented impact testing

1 Scope

This document specifies a test method for the determination of puncture impact properties of rigid plastics, in the form of flat specimens, using instruments for measuring force and deflection. It is applicable if a force-deflection or force-time diagram, recorded at nominal constant striker velocity, is necessary for detailed characterization of the impact behaviour.

The test method is applicable to specimens with a thickness between 1 mm to 4 mm.

The method is suitable for use with the following types of material:

- rigid thermoplastic moulding and extrusion materials, including filled, unfilled and reinforced compounds and sheets;
- rigid thermosetting moulding and extrusion materials, including filled and reinforced compounds, sheets and laminates;
- fibre-reinforced thermoset and thermoplastic composites incorporating unidirectional or multi-directional reinforcements such as mats, woven fabrics, woven rovings, chopped strands, combination and hybrid reinforcements, rovings, milled fibres and sheets made from pre-impregnated materials (prepregs).

The method is also applicable to specimens which are either moulded or machined from finished products, laminates and extruded or cast sheet.

The test results are comparable only if the conditions of preparation of the specimens, their dimensions and surfaces as well as the test conditions are the same. In particular, results determined on specimens of different thickness cannot be compared with one another (see [Annex E](#)). Comprehensive evaluation of the reaction to impact stress can be obtained by determinations made as a function of impact velocity and temperature for different material variables, such as crystallinity and moisture content.

The impact behaviour of finished products cannot be predicted directly from this test, but specimens may be taken from finished products (see above) for tests by this method.

Test data developed by this method is not intended to be used for design calculations. However, information on the typical behaviour of the material can be obtained by testing at different temperatures and impact velocities (see [Annex D](#)) by varying the thickness (see [Annex E](#)) and by testing specimens prepared under different conditions.

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

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*

ISO 294-3, *Plastics — Injection moulding of test specimens of thermoplastic materials — Part 3: Small plates*

ISO 295, *Plastics — Compression moulding of test specimens of thermosetting materials*

ISO 1268-1, *Fibre-reinforced plastics — Methods of producing test plates — Part 1: General conditions*

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

ISO 2818, *Plastics — Preparation of test specimens by machining*

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

ISO 20753, *Plastics — Test specimens*

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 <https://www.electropedia.org/>

3.1 impact velocity

v_0

velocity of the striker relative to the support at the moment of impact

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

3.2 force

F

force exerted by the striker on the test specimen in the direction of impact

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

3.3 deflection

l

relative displacement between the striker and the specimen support, starting from the first contact between the striker and the test specimen

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

3.4 energy

E

energy expended in deforming and penetrating the test specimen up to a deflection l

Note 1 to entry: Energy is expressed in joules (J).

Note 2 to entry: Energy is measured as the integral of the force-deflection curve starting from the point of impact up to a deflection l .