

Plastics — Determination of puncture impact behaviour of rigid plastics —

Part 1: Non-instrumented impact testing

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National foreword

This British Standard is the official English language version of EN ISO 6603-1:2000. It is identical with ISO 6603-1:2000. It supersedes BS EN ISO 6603-1:1997 which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee PRI/21, Testing of plastics, which has the responsibility to:

- aid enquirers to understand the text;
- present to the responsible international/European committee any enquiries on the interpretation, or proposals for change, and keep the UK interests informed;
- monitor related international and European developments and promulgate them in the UK.

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

Cross-references

Attention is drawn to the fact that CEN and CENELEC Standards normally include an annex which lists normative references to international publications with their corresponding European publications. The British Standards which implement these international or European publications may be found in the BSI Standards Catalogue under the section entitled “International Standards Correspondence Index”, or by using the “Find” facility of the BSI Standards Electronic Catalogue.

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Summary of pages

This document comprises a front cover, an inside front cover, the EN ISO title page, the EN ISO foreword page, the ISO title page, pages ii to iv, pages 1 to 21, the annex ZA page, an inside back cover and a back cover.

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Plastiques - Détermination du comportement des plastiques rigides perforés sous l'effet d'un choc - Partie 1: Essais de choc non instrumentés (ISO 6603-1:2000)

Kunststoffe - Bestimmung des Durchstoßverhaltens von festen Kunststoffen - Teil 1: Nicht-instrumentierter Schlagversuch (ISO 6603:2000)

This European Standard was approved by CEN on 14 February 2000.

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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 Central Secretariat has the same status as the official versions.

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Foreword

The text of the International Standard ISO 6603-1:2000 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 IBN.

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 September 2000, and conflicting national standards shall be withdrawn at the latest by September 2000.

According to the CEN/CENELEC Internal Regulations, the national standards organizations of the following countries are bound to implement this European Standard: Austria, Belgium, Czech Republic, Denmark, Finland, France, Germany, Greece, Iceland, Ireland, Italy, Luxembourg, Netherlands, Norway, Portugal, Spain, Sweden, Switzerland and the United Kingdom.

Endorsement notice

The text of the International Standard ISO 6603-1:2000 was approved by CEN as a European Standard without any modification.

NOTE: Normative references to International Standards are listed in annex ZA (normative).

**Plastics — Determination of puncture
impact behaviour of rigid plastics —**

**Part 1:
Non-instrumented impact testing**

*Plastiques — Détermination du comportement des plastiques rigides
perforés sous l'effet d'un choc —*

Partie 1: Essais de choc non instrumentés



Reference number
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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.

International Standards are drafted in accordance with the rules given in the ISO/IEC Directives, Part 3.

Draft International Standards adopted by the technical committees are circulated to the member bodies for voting. Publication as an International Standard requires approval by at least 75 % of the member bodies casting a vote.

Attention is drawn to the possibility that some of the elements of this part of ISO 6603 may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights.

International Standard ISO 6603-1 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 2, *Mechanical properties*.

This second edition cancels and replaces the first edition (ISO 6603-1:1985), which has been technically revised.

ISO 6603 consists of the following parts, under the general title *Plastics — Determination of puncture impact behaviour of rigid plastics*:

- *Part 1: Non-instrumented impact testing*
- *Part 2: Instrumented impact testing*

Annex A of this part of ISO 6603 is for information only.

Plastics — Determination of puncture impact behaviour of rigid plastics —

Part 1: Non-instrumented impact testing

1 Scope

This International Standard specifies methods for the determination of puncture-impact properties of rigid plastics in the form of flat test specimens, such as discs or square pieces, under defined conditions. Specimens may be moulded directly, cut from sheets or taken from finished products. Different types of test specimens and test conditions are defined.

These falling-dart methods are used to investigate the behaviour of plastic sheeting or mouldings under the impact of a striker applied perpendicular to the plane of the specimen.

This part of ISO 6603 can be used if it is sufficient to characterize the impact behaviour of plastics by a threshold value of impact-failure energy based on many test specimens. ISO 6603-2 is used if a force-deflection or force-time diagram, recorded at nominally constant striker velocity, is necessary for detailed characterization of the impact behaviour.

These test methods are applicable to specimens with a thickness between 1 mm and 4 mm.

NOTE For thicknesses less than 1 mm, ISO 7765 should preferably be used. Thicknesses greater than 4 mm may be tested if the equipment is suitable, but the test falls outside the scope of ISO 6603-1 and ISO 6603-2.

These methods are 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 non-unidirectional 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).

These methods are 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 of ISO 6603-2:—). Comprehensive evaluation of the reaction to impact stress requires that determinations be 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 test by these methods.

Test data developed by these methods should not 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 of ISO 6603-2:—), by varying the thickness (see annex E of ISO 6603-2:—) and by testing specimens prepared under different conditions.

Two statistical methods of test are described in this part of ISO 6603:

— Method A: staircase method (individual) (preferred)

In this method, a uniform energy increment is employed during testing. The energy is decreased or increased by the uniform increment after testing each specimen, depending upon the observed result (pass or fail) for the preceding test.

— Method B: group method (optional)

In this method, successive groups of at least ten test specimens are tested. The impact failure energy is calculated by statistics.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this part of ISO 6603. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this part of ISO 6603 are encouraged to investigate the possibility of applying the most recent editions of the normative documents indicated below. For undated references, the latest edition of the normative document referred to applies. Members of ISO and IEC maintain registers of currently valid International Standards.

ISO 291:1997, *Plastics — Standard atmospheres for conditioning and testing*.

ISO 293:1986, *Plastics — Compression moulding test specimens of thermoplastic materials*.

ISO 294-3:1996, *Plastics — Injection moulding of test specimens of thermoplastic materials — Part 3: Small plates*.

ISO 295:1991, *Plastics — Compression moulding of test specimens of thermosetting materials*.

ISO 1268:1974¹⁾, *Plastics — Preparation of glass fibre reinforced, resin bonded, low-pressure laminated plates or panels for test purposes*.

ISO 2818:1994, *Plastics — Preparation of test specimens by machining*.

ISO 6603-2:—²⁾, *Plastics — Determination of puncture impact behaviour of rigid plastics — Part 2: Instrumented impact testing*.

ISO 7765-1:1988, *Plastics film and sheeting — Determination of impact resistance by the free-falling dart method — Part 1: Staircase methods*.

ISO 7765-2:1994, *Plastics film and sheeting — Determination of impact resistance by the free-falling dart method — Part 2: Instrumented puncture test*.

1) Under revision.

2) To be published (Revision of ISO 6603-2:1989)