

Plastics — Determination of tensile-impact strength

The European Standard EN ISO 8256:1996 has the status of a British Standard

IMPORTANT NOTICE. Before reading this method it is essential to read BS 2782-0 Introduction issued separately

ICS 83.080.01

Committees responsible for this British Standard

The preparation of this British Standard was entrusted by the Plastics and Rubber Standards Policy Committee (PRM/-) to Technical Committee PRM/21, upon which the following bodies were represented:

- British Plastics Federation
- British Steel Industry
- British Telecommunications plc
- Department of Trade and Industry (National Physical Laboratory)
- EEA (the Association of Electronics, Telecommunications and Business Equipment Industries)
- Electrical and Electronic Insulation Association (BEAMA Ltd.)
- Electrical Installation Equipment Manufacturers Association (BEAMA Ltd.)
- GAMBICA (BEAMA Ltd.)
- Man-made Fibres Producers' Committee
- Ministry of Defence
- PIRA
- Packaging and Industrial Films Association
- Plastics and Rubber Institute
- RAPRA Technology Ltd.
- Standards Association of Australia
- Yarsley Technical Centre Ltd.

The following body was also represented in the drafting of the standard, through subcommittees and panels:

Malaysian Rubber Producers Research Association

This British Standard, having been prepared under the direction of the Plastics and Rubber Standards Policy Committee, was published under the authority of the Standards Board and comes into effect on 31 May 1991

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The following BSI references relate to the work on this standard:
Committee reference PRM/21
Draft for comment 87/38815 DC

ISBN 0 580 19681 X

Amendments issued since publication

Amd. No.	Date	Comments
6815	February 1992	
8635	August 1997	Indicated by a sideline in the margin

Contents

	Page
Committees responsible	Inside front cover
National foreword	ii
Foreword	2
1 Scope	3
2 Normative references	3
3 Definitions	3
4 Principle	4
5 Apparatus	4
6 Test specimens	5
7 Procedure	9
8 Expression of results	10
9 Precision	11
10 Test report	11
Annex A (normative) Determination of bounce-correction factor	12
Annex B (normative) Instructions for the construction and use of a windage and friction correction chart for method B	13
Annex C (informative) Determination of correction factor	15
Annex ZA (normative) Normative references to international publications with their relevant European publication	18
Figure 1 — Diagram showing relationship of pendulum to specimen clamps for method A	6
Figure 2 — Diagram showing relationship of pendulum to specimen clamps for method B after specimen rupture	7
Figure 3 — Test specimens	8
Figure A.1 — Typical correction-factor curve for single bounce of crosshead specimen-in-head tensile-impact machine	13
Figure B.1 — Method of construction of a windage and friction correction chart	14
Figure B.2 — Sample windage and friction correction chart	14
Table 1 — Characteristics of pendulum impact-testing machine	4
Table 2 — Specimen types and dimensions and distances between supports	5
List of references	Inside back cover

National foreword

This method has been prepared under the direction of the Plastics and Rubber Standards Policy Committee and is the English language version of EN ISO 8256:1996 *Plastics — Determination of tensile-impact strength* published by the European Committee for Standardization (CEN). It is identical with ISO 8256:1990 including Technical Corrigendum 1, published by the International Organization for Standardization (ISO).

Methods 354A and 354B correspond to methods A and B in ISO 8256.

Cross-references

International Standard	Corresponding British Standard
	BS 2782: <i>Methods of testing plastics</i>
ISO 179:1993	Method 359:1993 <i>Determination of Charpy impact strength</i>
ISO 180:1993	Method 350:1993 <i>Determination of Izod impact strength</i>
ISO 293:1986	Method 901A:1988 <i>Compression moulding test specimens of thermoplastic materials</i>
ISO 294:1995	Method 910A:1996 <i>Injection moulding test specimens of thermoplastic materials</i>
ISO 295:1991	Method 902A:1992 <i>Plastics. Compression moulding of test specimens of thermosetting materials</i>
ISO 1268:1974	Methods 920A to 920C:1977 <i>Preparation of glass fibre reinforced, resin bonded, low-pressure laminated plates or panels for test purposes</i>
ISO 2557-1:1989	Method 940A:1990 <i>Preparation of test specimens of amorphous thermoplastics in the form of bars with a specified reversion</i>
ISO 2557-2:1986	Method 940B:1989 <i>Preparation of test specimens of amorphous thermoplastics with a specified reversion by injection moulding rectangular plates</i>
ISO 2818:1994	Method 930A:1996 <i>Preparation by machining</i>
ISO 3167:1993	Method 931A:1993 <i>Preparation and use of multipurpose test specimens</i>

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Summary of pages

This document comprises a front cover, an inside front cover, pages i and ii, the EN ISO title page, pages 2 to 18, an inside back cover and a back cover.

This standard has been updated (see copyright date) and may have had amendments incorporated. This will be indicated in the amendment table on the inside front cover.

Plastics — Determination of tensile-impact strength

(ISO 8256:1990, including Technical Corrigendum 1:1991)

Plastiques — Détermination de la résistance au
choc-traction
(ISO 8256:1990, Rectificatif Technique 1:1991
inclus)

Kunststoffe — Bestimmung der
Schlagzugzähigkeit
(ISO 8256:1990 einschließlich Technische
Korrektur 1:1991)

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Up-to-date lists and bibliographical references concerning such national standards may be obtained on application to the Central Secretariat 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 Central Secretariat has the same status as the official versions.

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CEN

European Committee for Standardization
Comité Européen de Normalisation
Europäisches Komitee für Normung

Central Secretariat: rue de Stassart 36, B-1050 Brussels

Foreword

The text of the International Standard from Technical Committee ISO/TC 61, Plastics, of the International Organization for Standardization (ISO) has been taken over as a European Standard by 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 June 1997, and conflicting national standards shall be withdrawn at the latest by June 1997.

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

1 Scope

1.1 This International Standard specifies two methods for the determination of the energy required to rupture test specimens of plastics under a specified tensile-impact velocity. The tests can be described as tensile tests at comparatively high rates of straining. These methods can be used for materials too flexible or too thin to be tested with impact tests conforming to ISO 179 and ISO 180, and for more rigid materials. Different parameters are specified depending on the type of test specimen (see 6.1 and Figure 3).

1.2 These methods are used for investigating the behaviour of specified specimens under specified impact velocities, and for estimating the brittleness or the toughness of specimens within the limitations inherent in the test conditions. The response of plastics to comparatively high rates of straining is useful to describe, for example, the behaviour of materials when subjected to weathering or thermal ageing, as well as to assess their properties under corresponding service conditions.

1.3 These methods are applicable to specimens prepared from moulding materials or to specimens taken from finished or semi-finished products (for example mouldings, films, laminates or extruded or cast sheets). The methods are suitable for production control as well as for quality control. Test results gained on test specimens obtained from moulding compounds cannot be applied directly to mouldings of any given shape, because values may depend on the design of the moulding and the moulding conditions.

1.4 Results obtained by testing moulded specimens of different dimensions may not necessarily be the same. Equally, specimens cut from moulded products may not give the same results as specimens of the same dimensions moulded directly from the material. Results obtained by method A and method B may or may not be comparable.

1.5 These methods are not suitable for use as a source of data for design calculations on components. Information on the typical behaviour of a material can be obtained, however, by testing different types of test specimen prepared under different conditions, and testing at different temperatures.

2 Normative references

The following standards contain provisions which, through reference in this text, constitute provisions of this International Standard. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this International Standard are encouraged to investigate the possibility of applying the most recent editions of the standards indicated below. Members of IEC and ISO maintain registers of currently valid International Standards.

ISO 179:1982, *Plastics — Determination of Charpy impact strength of rigid materials.*

ISO 180:1982, *Plastics — Determination of Izod impact strength of rigid materials.*

ISO 291:1977, *Plastics — Standard atmospheres for conditioning and testing.*

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

ISO 294:1975, *Plastics — Injection moulding test specimens of thermoplastic materials.*

ISO 295:1974, *Plastics — Compression moulding test specimens of thermosetting materials.*

ISO 1268:1974, *Plastics — Preparation of glass fibre reinforced, resin bonded, low-pressure laminated plates or panels for test purposes.*

ISO 2557-1:1989, *Plastics — Amorphous thermoplastics — Preparation of test specimens with a specified maximum reversion — Part 1: Bars.*

ISO 2557-2:1986, *Plastics — Amorphous thermoplastics — Preparation of test specimens with a specified reversion — Part 2: Plates.*

ISO 2818:1980, *Plastics — Preparation of test specimens by machining.*

ISO 3167:1983, *Plastics — Preparation and use of multipurpose test specimens.*

3 Definitions

For the purposes of this International Standard, the following definitions apply.

3.1 tensile-impact strength of unnotched specimens

the energy absorbed in breaking an unnotched specimen under specified conditions, referred to the original cross-sectional area of the specimen
it is expressed in kilojoules per square metre (kJ/m²)

3.2 tensile-impact strength of notched specimens

the energy absorbed in breaking a notched specimen under specified conditions, referred to the original cross-sectional area of the specimen at the notch
it is expressed in kilojoules per square metre (kJ/m²)

4 Principle

The energy utilized in this test method is delivered by a single swing of the pendulum of a tensile-impact machine. The energy to fracture is determined by the kinetic energy extracted from the pendulum in the process of breaking the specimen. Corrections are made for the energy to toss or bounce the crosshead.

The specimen is impacted at the bottom of the swing of the pendulum. The specimen is horizontal at rupture. One end of the specimen, at impact, is held either by the frame or the pendulum and the other end by the crosshead. The crosshead may be either mounted stationary on the support frame (method A) or carried downward together with the pendulum (method B).

5 Apparatus

5.1 Test machine

5.1.1 The test machine shall be the pendulum type and shall be of rigid construction. It shall be capable of measuring the impact energy expended in breaking a test specimen. The value of the impact energy shall be taken as equal to the difference between the initial potential energy in the pendulum and the energy remaining in the pendulum after breaking the test specimen. The energy reading shall be accurately corrected for friction and air-resistance losses and for scale errors.

5.1.2 The machine shall have the characteristics shown in Table 1. The frictional loss shall be periodically checked.

NOTE 1 In order to apply the test to the full range of materials specified in 1.3, it is necessary to use more than one machine or to use a set of interchangeable pendulums. It is not advisable to compare results obtained with different pendulums.

5.1.3 The machine shall be securely fixed to a foundation having a mass of at least 20 times that of the heaviest pendulum in use. It shall be adjusted so that the orientations of the striker and supports are as specified in 5.2 and 5.3.

5.1.4 The distance between the axis of rotation and the centre of impact of the pendulum shall be within $\pm 1\%$ of the distance from the axis of rotation to the centre of the test specimen.

5.1.5 The dial, or other indicator of the energy consumed, shall be capable of being read to an accuracy of $\pm 1\%$ of full-scale deflection.

5.1.6 The machine shall be of the type shown schematically in Figure 1 for method A, or of the type shown in Figure 2 for method B.

5.2 Pendulum

5.2.1 The pendulum shall be constructed of a single- or multiple-membered arm holding the head, in which the greatest mass is concentrated. A rigid pendulum is essential to maintain the proper clearances and geometric relationships between related parts and to minimize energy losses, which are always included in the measured impact-energy value.

5.2.2 Accurate means shall be available to determine and minimize energy losses due to windage and friction (see Annex B).

5.3 Crosshead

5.3.1 The crosshead, which acts as a specimen clamp for method A, shall be made from a material which guarantees a substantially inelastic impact (e.g. aluminium).

The mass of the crosshead shall be selected from the values given in Table 1.

Table 1 — Characteristics of pendulum impact-testing machine

Initial potential energy J	Velocity at impact m/s	Maximum permissible frictional loss %	Crosshead mass ^a	
			Method A g	Method B g
2,0	2,6 to 3,2	1	15 $\pm$ 1 or 30 $\pm$ 1	15 $\pm$ 1
4,0	2,6 to 3,2	0,5	15 $\pm$ 1 or 30 $\pm$ 1	15 $\pm$ 1
7,5	3,4 to 4,1	0,5	30 $\pm$ 1 or 60 $\pm$ 1	30 $\pm$ 1
15,0	3,4 to 4,1	0,5	30 $\pm$ 1 or 60 $\pm$ 1	120 $\pm$ 1
25,0	3,4 to 4,1	0,5	60 $\pm$ 1 or 120 $\pm$ 1	120 $\pm$ 1
50,0	3,4 to 4,1	0,5	60 $\pm$ 1 or 120 $\pm$ 1	120 $\pm$ 1

^a For method A, use the lighter crosshead wherever possible.