SLOVENSKI STANDARD
SIST EN ISO 13802:2006

01-julij-2006

Polimerni materiali ï Overjanje strojev z nihalom za ugotavljanje udarnih lastnosti ï Preskuġanje po Charpyju, Izodu in natezno-udarno preskuġanje (ISO 13802:1999, vkljuļ en Corrigendum 1:2000)

Plastics - Verification of pendulum impact-testing machines - Charpy, Izod and tensile impact-testing (ISO 13802:1999, including Corrigendum 1:2000)

Kunststoffe - Verifizierung von Pendelschlagwerken - Charpy-, Izod- und Schlagzugversuch (ISO 13802:1999, einschließlich Berichtigung 1:2000)

Plastiques - Vérification des machines d'essai de choc pendulaire - Essais de choc Charpy, Izod et de choc-traction (ISO 13802:1999, Corrigendum 1:2000 inclus)

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ICS:

83.200	Oprema za gumarsko industrijo in industrijo polimernih materialov	Equipment for the rubber and plastics industries

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EUROPEAN STANDARD

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English Version

Plastics - Verification of pendulum impact-testing machines - Charpy, Izod and tensile impact-testing (ISO 13802:1999, including Corrigendum 1:2000)

Plastiques - Vérification des machines d'essai de choc pendulaire - Essais de choc Charpy, Izod et de choc-traction (ISO 13802:1999, Corrigendum 1:2000 inclus)

Kunststoffe - Verifizierung von Pendelschlagwerken - Charpy-, Izod- und Schlagzugversuch (ISO 13802:1999, einschließlich Berichtigung 1:2000)

This European Standard was approved by CEN on 16 March 2006.

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 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.

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

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

Management Centre: rue de Stassart, 36 B-1050 Brussels

Foreword

The text of ISO 13802:1999, including Corrigendum 1:2000 has been prepared by Technical Committee ISO/TC 61 "Plastics" of the International Organization for Standardization (ISO) and has been taken over as EN ISO 13802:2006 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 October 2006, and conflicting national standards shall be withdrawn at the latest by October 2006.

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

Endorsement notice

The text of ISO 13802:1999, including Corrigendum 1:2000 has been approved by CEN as EN ISO 13802:2006 without any modifications.

INTERNATIONAL STANDARD

ISO 13802

First edition
1999-10-15

Plastics — Verification of pendulum impact-testing machines — Charpy, Izod and tensile impact-testing

Plastiques — Vérification des machines d'essai de choc pendulaire — Essais de choc Charpy, Izod et choc-traction

Reference number
ISO 13802:1999(E)

Contents

International Organization for Standardization
Case postale 56 • CH-1211 Genève 20 • Switzerland
Internet iso@iso.ch

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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.

International Standard ISO 13802 was prepared by Technical Committee ISO/TC 61, *Plastics*, Subcommittee SC 2, *Mechanical properties*.

Annexes A to E of this International Standard are for information only.

Plastics — Verification of pendulum impact-testing machines — Charpy, Izod and tensile impact-testing

1 Scope

This International Standard specifies methods for the verification of pendulum impact-testing machines used for the Charpy impact test, Izod impact test and tensile impact test described in ISO 179-1, ISO 180 and ISO 8256, respectively.

The test machines covered by this International Standard are of the pendulum type. The impact energy W (see 3.12) absorbed in impacting a test specimen is taken as being equal to the difference between the potential energy E (see 3.11) of the pendulum and the energy remaining in the pendulum after impacting the specimen. The impact energy is corrected for friction and air-resistance losses (see Table 2 and 5.6).

Methods are described for verification of the geometrical and physical properties of the different parts of the test machine. The verification of some geometrical properties is difficult to perform on the assembled instrument. It is therefore assumed that the manufacturer is responsible for the verification of such properties and for providing reference planes on the instrument that enable proper verification in accordance with this International Standard.

These methods are for use when the machine is being installed, is being repaired, has been moved or is undergoing periodic checking.

This International Standard is applicable to pendulum-type impact-testing machines, of different capacities and/or designs, with the geometrical and physical properties defined in clause 5.

A pendulum impact-testing machine verified in accordance with this International Standard, and assessed as satisfactory, is considered suitable for impact testing with unnotched and notched test specimens of different types.

Annex A describes the relationships between the various characteristic pendulum lengths, the potential energy and the moment of inertia of the pendulum.

Annex B explains how to calculate the ratio of frame mass to pendulum mass required to avoid errors in the impact energy.

Annex C describes, for Charpy impact testing, the changes in pendulum velocity just after impact as a function of impact energy and gives the ranges of impact energies for the measurement of which pendulums of specified capacity have to be used.

Annex D discusses the stiffness of the base of the frame necessary to avoid resonant oscillations in the frame due to reaction forces caused by the moving pendulum.

Annex E gives the dimensions of a gauge plate suitable for the verification of Charpy impact-testing machines.

2 Normative references

The following normative documents contain provisions which, through reference in this text, constitute provisions of this International Standard. For dated references, subsequent amendments to, or revisions of, any of these publications do not apply. However, parties to agreements based on this International Standard 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 179-1:—[1], *Plastics — Determination of Charpy impact properties — Part 1: Non-instrumented impact test.*

ISO 179-2:1997, *Plastics — Determination of Charpy impact properties — Part 2: Instrumented impact test.*

ISO 180:—[2], *Plastics — Determination of Izod impact strength.*

ISO 8256:1990, *Plastics — Determination of tensile-impact strength.*

3 Definitions

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

3.1
verification
proof, with the use of calibrated standards or standard reference materials, that the calibration of an instrument is acceptable

3.2
calibration
set of operations that establish, under specified conditions, the relationship between values indicated by a measuring instrument or measuring system and values corresponding to appropriate standards or known values derived from standards

3.3
period of oscillation of the pendulum
T_P
period, expressed in seconds, of a single complete oscillation (to and fro) of the pendulum, oscillating at angles of oscillation of less that 5° to each side of the vertical

3.4
centre of percussion
point on a pendulum at which a perpendicular impact in the plane of swing does not cause reaction forces at the axis of rotation of the pendulum

3.5
pendulum length
L_P
distance, expressed in metres, between the axis of rotation of the pendulum and the centre of percussion (3.4); it is the length of an equivalent theoretical pendulum mass concentrated at the point which gives the same period of oscillation with its T_P (3.3) as the actual pendulum

3.6
gravity length
L_M
distance, expressed in metres, between the axis of rotation of the pendulum and the centre of gravity of the pendulum

3.7
gyration length
L_G
distance, expressed in metres, between the axis of rotation of the pendulum and the point at which the pendulum mass m_P would have to be concentrated to give the same moment of inertia as the pendulum

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[1] To be published. (Revision of ISO 179:1993)

[2] To be published. (Revision of ISO 180:1993)

3.8
impact length
L_I
distance, expressed in metres, between the axis of the rotation of the pendulum and the point of impact of the striking edge at the centre of the specimen face

3.9
starting angle
α_0
angle, expressed in degrees, relative to the vertical, from which the pendulum is released

NOTE Usually the test specimen is impacted at the lowest point of the pendulum swing (α_I = 0°). In this case, the starting angle will also be the angle of fall [see Figure 1b)].

3.10
impact velocity
v_I
velocity, expressed in metres per second, of the pendulum at the moment of impact

3.11
potential energy
E
potential energy, expressed in joules, of the pendulum in its starting position, relative to its position at impact

3.12
impact energy
W
energy, expressed in joules, required to deform, break and push away the test specimen

3.13
frame
that part of the machine carrying the pendulum bearings, the supports, the vice and/or clamps, the measurement instruments and the mechanism for holding and releasing the pendulum; the mass of the frame, m_F, is expressed in kilograms

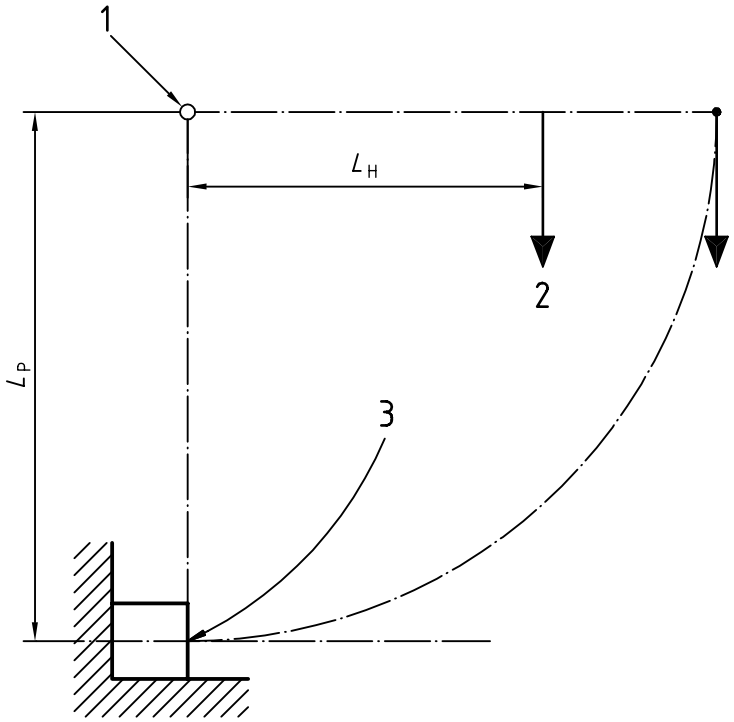
3.14
period of oscillation of the frame
T_F
period, expressed in seconds, of the freely decaying, horizontal oscillation of the frame; it characterizes the oscillation of the frame vibrating against the stiffness of the (resilient) mounting, e.g. a test bench and/or its foundation (which may include damping material for instance) (see annex D)

3.15
mass of the pendulum
$m_{P,max}$
mass, expressed in kilograms, of the heaviest pendulum used

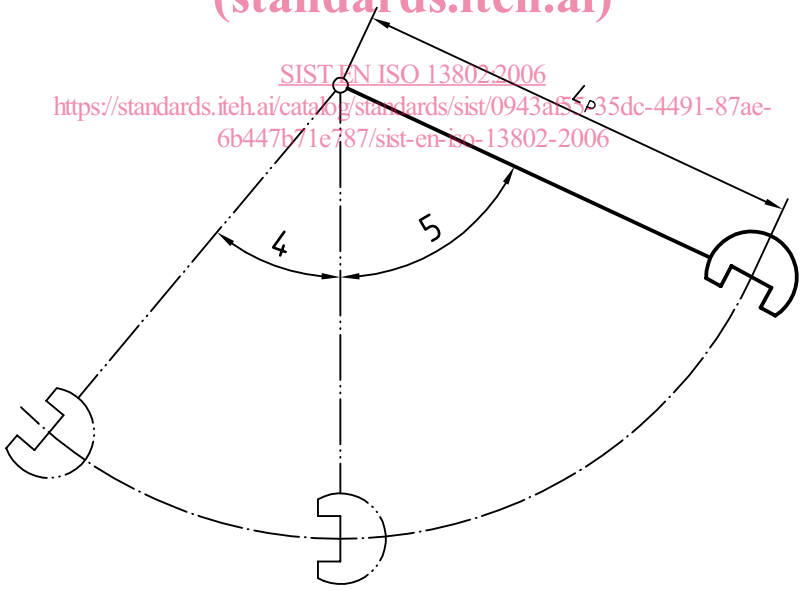
4 Measurement instruments

The verification methods described in this International Standard call for the use of straight edges, vernier calipers, set squares, levels and dynamometers, load cells or scales and timing devices to check if the geometrical and physical properties of the components of the test machine conform to the requirements given in this International Standard.

These measurement instruments shall be accurate enough to measure the parameters within the tolerance limits given in clause 5.



a) Quantities necessary to determine the horizontal moment



b) Quantities necessary for scale calibration and for potential-energy calculations

Key

1 Axis of rotation
2 Vertical force, F_H
3 Centre of percussion
4 Angle of rise, α_R
5 Starting angle, α_0

Figure 1 — Quantities necessary for energy verification

5 Verification of test machines

5.1 Components of test machines

The essential components are as follows:

5.1.1 Pendulum

5.1.1.1 Pendulum rod.

5.1.1.2 Striker, with striking edge for bending impact tests (see ISO 179 and ISO 180) or with striking surfaces or clamps for tensile impact testing (see ISO 8256:1990, test methods A and B respectively).

5.1.2 Frame

5.1.2.1 Test specimen supports, for Charpy impact testing (see ISO 179);

5.1.2.2 Vice, for Izod impact testing (see ISO 180);

5.1.2.3 Clamps or stops, for tensile impact testing (see ISO 8256, methods A and B);

5.1.2.4 Mechanism for holding and releasing the pendulum.

5.1.3 Energy indicating device

5.1.4 Crossheads for tensile impact testing

5.2 Pendulum

5.2.1 Pendulum length, L_P

Determine the pendulum length L_P from the period of oscillation T_P of the pendulum using the equation

$$L_P = \frac{g T_P^2}{4\pi^2} \quad (1)$$

where

g is the local acceleration due to gravity, in metres per second squared;

T_P is the period of oscillation of the pendulum, in seconds.

The value of T_P shall be determined to a precision of 0,2 %.

Determine the period of oscillation T_P as the mean value of four determinations, of total duration $n \cdot T_P$, of n consecutive oscillations to an accuracy of 0,1 s. Together with the precision demanded above of L_P, this results in a minimum number n of oscillation given by $n \geqslant 100/T_P$.

The use of a timing device accurate to better than 0,1 s allows the number of oscillations to be reduced accordingly (see Table 1).