SLOVENSKI STANDARD
SIST EN ISO 148-2:2009

01-april-2009

Nadomeġ a:
SIST EN 10045-2:1996
SIST EN 10045-2:1996/AC1:1997

Kovinski materiali - Udarni preskus po Charpyju - 2. del: Preverjanje preskusnih naprav (ISO 148-2:2008)

Metallic materials - Charpy pendulum impact test - Part 2: Verification of testing machines (ISO 148-2:2008)

Metallische Werkstoffe - Kerbschlagbiegeversuch nach Charpy - Teil 2: Prüfung der Prüfmaschinen (Pendelschlagwerke) (ISO 148-2:2008)

Matériaux métalliques - Essai de flexion par choc sur éprouvette Charpy - Partie 2: Vérification des machines d'essai (mouton-pendule) (ISO 148-2:2008)

Ta slovenski standard je istoveten z: **EN ISO 148-2:2008**

ICS:

77.040.10 Mehansko preskušanje kovin Mechanical testing of metals

SIST EN ISO 148-2:2009 **en,fr**

EUROPEAN STANDARD

NORME EUROPÉENNE

EUROPÄISCHE NORM

EN ISO 148-2

December 2008

ICS 77.040.10

English Version

Metallic materials - Charpy pendulum impact test - Part 2: Verification of testing machines (ISO 148-2:2008)

Matériaux métalliques - Essai de flexion par choc sur éprouvette Charpy - Partie 2: Vérification des machines d'essai (mouton-pendule) (ISO 148-2:2008)

Metallische Werkstoffe - Kerbschlagbiegeversuch nach Charpy - Teil 2: Prüfung der Prüfmaschinen (Pendelschlagwerke) (ISO 148-2:2008)

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Foreword

This document (EN ISO 148-2:2008) has been prepared by Technical Committee ISO/TC 164 "Mechanical testing of metals" in collaboration with Technical Committee ECISS/TC 1 "Steel - Mechanical testing" the secretariat of which is held by AFNOR.

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of an identical text or by endorsement, at the latest by June 2009, and conflicting national standards shall be withdrawn at the latest by June 2009.

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Endorsement notice

The text of ISO 148-2:2008 has been approved by CEN as a EN ISO 148-2:2008 without any modification.

INTERNATIONAL STANDARD

ISO 148-2

Second edition
2008-12-15

Metallic materials — Charpy pendulum impact test —

Part 2: Verification of testing machines

Matériaux métalliques — Essai de flexion par choc sur éprouvette Charpy —
Partie 2: Vérification des machines d'essai (mouton-pendule)

Reference number
ISO 148-2:2008(E)

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Published in Switzerland

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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 2.

The main task of technical committees is to prepare International Standards. 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.

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ISO 148-2 was prepared by Technical Committee ISO/TC 164, *Mechanical testing of metals*, Subcommittee SC 4, *Toughness testing — Fracture (F), Pendulum (P), Tear (T)*.

This second edition cancels and replaces the first edition (ISO 148-2:1998), which has been technically revised.

ISO 148 consists of the following parts, under the general title *Metallic materials — Charpy pendulum impact test*:

— *Part 1: Test method*

— *Part 2: Verification of testing machines*

— *Part 3: Preparation and characterization of Charpy V-notch test pieces for indirect verification of pendulum impact machines*

Introduction

The suitability of a pendulum impact testing machine for acceptance testing of metallic materials has usually been based on a calibration of its scale and verification of compliance with specified dimensions, such as the shape and spacing of the anvils supporting the specimen. The scale calibration is commonly verified by measuring the mass of the pendulum and its elevation at various scale readings. This procedure for evaluation of machines had the distinct advantage of requiring only measurements of quantities that could be traced to national standards. The objective nature of these traceable measurements minimized the necessity for arbitration regarding the suitability of the machines for material acceptance tests.

However, sometimes two machines that had been evaluated by the direct-verification procedures described above, and which met all dimensional requirements, were found to give significantly different impact values when testing test pieces of the same material. This difference was commercially important when values obtained using one machine met the material specification, while the values obtained using the other machine did not. To avoid such disagreements, some purchasers of materials added the requirement that all pendulum impact testing machines used for acceptance testing of material sold to them must be indirectly verified by testing reference test pieces supplied by them. A machine was considered acceptable only if the values obtained using the machine agreed, within specified limits, with the value furnished with the reference test pieces.

Metallic materials — Charpy pendulum impact test —

Part 2: Verification of testing machines

1 Scope

This part of ISO 148 covers the verification of the constructional elements of pendulum-type impact testing machines. It is applicable to machines with 2 mm or 8 mm strikers used for pendulum impact tests carried out, for instance, in accordance with ISO 148-1.

It can analogously be applied to pendulum impact testing machines of various capacities and of different design.

Impact machines used for industrial, general or research laboratory testing of metallic materials in accordance with this part of ISO 148 are referred to as industrial machines. Those with more stringent requirements are referred to as reference machines. Specifications for the verification of reference machines are found in ISO 148-3.

This part of ISO 148 describes two methods of verification:

a) The direct method, which is static in nature, involves measurement of the critical parts of the machine to ensure that it meets the requirements of this part of ISO 148. Instruments used for the verification and calibration are traceable to national standards. Direct methods are used when a machine is being installed or repaired, or if the indirect method gives a non-conforming result.

b) The indirect method, which is dynamic in nature, uses reference test pieces to verify points on the measuring scale.

A pendulum impact testing machine is not in compliance with this part of ISO 148 until it has been verified by both the direct and indirect methods and meets the requirements of Clauses 6 and 7.

The requirements for the reference test pieces are found in ISO 148-3.

This part of ISO 148 takes into account the total energy absorbed in fracturing the test piece using an indirect method. This total absorbed energy consists of

— the energy needed to break the test piece itself, and

— the internal energy losses of the pendulum impact testing machine performing the first half-cycle swing from the initial position.

NOTE Internal energy losses are due to

— air resistance, friction of the bearings of the rotation axis and of the indicating pointer of the pendulum which can be determined by the direct method (see 6.4.5), and

— shock of the foundation, vibration of the frame and pendulum for which no suitable measuring methods and apparatus have been developed.

2 Normative references

The following referenced documents are indispensable for the application 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 148-1, *Metallic materials — Charpy pendulum impact test — Part 1: Test method*

ISO 148-3, *Metallic materials — Charpy pendulum impact test — Part 3: Preparation and characterization of Charpy V-notch test pieces for indirect verification of pendulum impact machines*

3 Terms and definitions

For the purposes of this document, the following terms and definitions apply.

3.1 Definitions pertaining to the machine

3.1.1
anvil
portion of the machine that serves to properly position the test piece for impact with respect to the striker and the test piece supports, and supports the test piece under the force of the strike

3.1.2
base
that part of the framework of the machine located below the horizontal plane of the supports

3.1.3
centre of percussion
that point in a body at which, on striking a blow, the percussive action is the same as if the whole mass of the body were concentrated at the point

NOTE When a simple pendulum delivers a blow along a horizontal line passing through the centre of percussion, there is no resulting horizontal reaction at the axis of rotation.

See Figure 4.

3.1.4
centre of strike
that point on the striking edge of the pendulum at which, in the free hanging position of the pendulum, the vertical edge of the striker meets the upper horizontal plane of a test piece of half standard height (i.e. 5 mm) or equivalent gauge bar resting on the test piece supports

See Figure 4.

3.1.5
industrial machine
pendulum impact machine used for industrial, general, or most research-laboratory testing of metallic materials

NOTE 1 These machines are not used to establish reference values.

NOTE 2 Industrial machines are verified using the procedures described in this part of ISO 148.

3.1.6
reference machine
pendulum impact testing machine used to determine certified values for batches of reference test pieces

3.1.7
striker
portion of the pendulum that contacts the test piece

NOTE The edge that actually contacts the test piece has a radius of 2 mm (the 2 mm striker) or a radius of 8 mm (the 8 mm striker).

See Figure 2.

3.1.8
test piece supports
portion of the machine that serves to properly position the test piece for impact with respect to the centre of percussion of the pendulum, the striker and the anvils

See Figures 2 and 3.

3.2 Definitions pertaining to energy

3.2.1
total absorbed energy
K_T
total absorbed energy required to break a test piece with a pendulum impact testing machine, which is not corrected for any losses of energy

NOTE It is equal to the difference in the potential energy from the starting position of the pendulum to the end of the first half swing during which the test piece is broken (see 6.3).

3.2.2
initial potential energy
potential energy
K_P
difference between the potential energy of the pendulum hammer prior to its release for the impact test, and the potential energy of the pendulum hammer at the position of impact, as determined by direct verification

NOTE See 6.4.2.

3.2.3
absorbed energy
K
energy required to break a test piece with a pendulum impact testing machine, after correction for friction

NOTE The letter V or U is used to indicate the notch geometry, that is KV or KU. The number 2 or 8 is used as a subscript to indicate striker radius, for example KV_2.

3.2.4
calculated energy
K_{calc}
energy calculated from values of angle, length, and force measured during direct verification

3.2.5
nominal initial potential energy
nominal energy
K_N
energy assigned by the manufacturer of the pendulum impact testing machine

3.2.6
indicated absorbed energy
K_S
energy indicated by the display/dial of the testing machine, which may or may not need to be corrected for friction to determine absorbed energy, K