INTERNATIONAL STANDARD

ISO 148-1

Third edition
2016-10-15

Metallic materials — Charpy pendulum impact test —

Part 1: Test method

Matériaux métalliques — Essai de flexion par choc sur éprouvette Charpy —

Partie 1: Méthode d'essai

Reference number
ISO 148-1:2016(E)

© ISO 2016



COPYRIGHT PROTECTED DOCUMENT

© ISO 2016, Published in Switzerland

All rights reserved. Unless otherwise specified, no part of this publication may be reproduced or utilized otherwise in any form or by any means, electronic or mechanical, including photocopying, or posting on the internet or an intranet, without prior written permission. Permission can be requested from either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Ch. de Blandonnet 8 • CP 401
CH-1214 Vernier, Geneva, Switzerland
Tel. +41 22 749 01 11
Fax +41 22 749 09 47
copyright@iso.org
www.iso.org

 © ISO 2016 – All rights reserved

Contents

Page

Foreword ... **iv**

1 Scope ... **1**

2 Normative references ... **1**

3 Terms and definitions ... **1**
3.1 Definitions pertaining to energy ... 1
3.2 Definitions pertaining to test piece ... 2

4 Symbols and abbreviated terms ... **2**

5 Principles of the test ... **3**

6 Test pieces ... **3**
6.1 General ... 3
6.2 Notch geometry ... 4
6.2.1 V-notch ... 4
6.2.2 U-notch ... 4
6.3 Tolerance of the test pieces ... 4
6.4 Preparation of the test pieces ... 4
6.5 Marking of the test pieces ... 4

7 Test equipment ... **4**
7.1 General ... 4
7.2 Installation and verification ... 5
7.3 Striker ... 5

8 Test procedure ... **5**
8.1 General ... 5
8.2 Friction measurement ... 5
8.3 Test temperature ... 6
8.4 Specimen transfer ... 7
8.5 Exceeding machine capacity ... 7
8.6 Incomplete fracture ... 7
8.7 Test piece jamming ... 8
8.8 Post-fracture inspection ... 8

9 Test report ... **8**
9.1 Mandatory information ... 8
9.2 Optional information ... 8

Annex A (informative) **Self-centring tongs** ... **12**

Annex B (informative) **Lateral expansion** ... **13**

Annex C (informative) **Fracture appearance** ... **16**

Annex D (informative) **Absorbed energy vs. temperature curve and the transition temperature** ... **19**

Annex E (informative) **Measurement uncertainty of an absorbed energy value, *K*** ... **21**

Bibliography ... **29**

© ISO 2016 – All rights reserved

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 documents 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).

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. ISO shall not be held responsible for identifying any or all such patent rights. Details of any patent rights identified during the development of the document will be in the Introduction and/or on the ISO list of patent declarations received (see www.iso.org/patents).

Any trade name used in this document is information given for the convenience of users and does not constitute an endorsement.

For an explanation on the meaning of ISO specific terms and expressions related to conformity assessment, as well as information about ISO's adherence to the World Trade Organization (WTO) principles in the Technical Barriers to Trade (TBT) see the following URL: www.iso.org/iso/foreword.html.

The committee responsible for this document is ISO/TC 164, *Mechanical testing of metals*, Subcommittee SC 4, *Toughness testing — Fracture (F), Pendulum (P), Tear (T)*.

This third edition cancels and replaces the second edition (ISO 148-1:2009), 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*

© ISO 2016 – All rights reserved

Metallic materials — Charpy pendulum impact test —

Part 1: Test method

1 Scope

This part of ISO 148 specifies the Charpy (V-notch and U-notch) pendulum impact test method for determining the energy absorbed in an impact test of metallic materials. This part of ISO 148 does not cover instrumented impact testing, which is specified in ISO 14556.

Annexes B and C are based on ASTM E23 and are used with the permission of ASTM International, 100 Barr Harbor Drive, P.O. Box C700, West Conshohocken, PA 19428-2959, USA.

2 Normative references

The following referenced documents, in whole or in part, are normatively referenced in this document and 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 148-2, *Metallic materials — Charpy pendulum impact test — Part 2: Verification of testing machines*

ISO 286-1, *Geometrical product specifications (GPS) — ISO code system for tolerances on linear sizes — Part 1: Basis of tolerances, deviations and fits*

3 Terms and definitions

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

3.1 Definitions pertaining to energy

3.1.1
initial potential energy
potential energy
K_p
potential energy of the pendulum hammer prior to its release for the impact test, as determined by direct verification

3.1.2
absorbed energy
K
energy required to break a test piece with a pendulum impact testing machine, after correction for friction

Note 1 to entry: 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 the radius of the striker, for example KV_2.

3.1.3
nominal initial potential energy
nominal energy
K_N
energy assigned by the manufacturer of the pendulum impact testing machine

© ISO 2016 – All rights reserved

3.2 Definitions pertaining to test piece

3.2.1
width
W
distance between the notched face and the opposite face

Note 1 to entry: See Figure 1.

Note 2 to entry: In previous versions of the ISO 148 series (prior to 2016), the distance between the notched face and the opposite face was specified as "height". Changing this dimension to "width" makes this part of ISO 148 consistent with the terminology used in other ISO fracture standards.

3.2.2
thickness
B
dimension perpendicular to the width and parallel to the notch

Note 1 to entry: See Figure 1.

Note 2 to entry: In previous versions of the ISO 148 series (prior to 2016), the dimension perpendicular to the width that is parallel to the notch was specified as "width". Changing this dimension to "thickness" makes this part of ISO 148 consistent with the terminology used in other ISO fracture standards.

3.2.3
length
L
largest dimension perpendicular to the notch

Note 1 to entry: See Figure 1.

4 Symbols and abbreviated terms

The symbols and designations applicable to this part of ISO 148 are indicated in Tables 1 and 2, and are illustrated in Figure 2.

Table 1 — Symbols and their unit and designation

Symbol	Unit	Designation
B	mm	thickness of test piece
α	°	angle of fall of the pendulum
β_1	J or °	angle of rise when the machine is operated in the normal manner without a test piece in position
β_2	J or °	angle of rise when the machine is operated in the normal manner without a test piece in position and without resetting the indication mechanism
L	mm	length of test piece
LE	mm	lateral expansion
K	J	absorbed energy (expressed as KV_2, KV_8, KU_2, KU_8, to identify specific notch geometries and the radius of the striking edge)
K_1	J or °	indicated absorbed energy when the machine is operated in the normal manner without a test piece in position
K_2	J or °	indicated absorbed energy when the machine is operated in the normal manner without a test piece in position and without resetting the indication mechanism
K_N	J or °	nominal initial potential energy
K_p	J	initial potential energy (potential energy)
KV_2	J	absorbed energy for a V-notch test piece using a 2 mm striker

© ISO 2016 – All rights reserved