DRAFT INTERNATIONAL STANDARD ISO/DIS 17340

ISO/TC **164**/SC **2** Secretariat: **JISC**

Voting begins on **2013-01-05** Voting terminates on **2013-04-05**

INTERNATIONAL ORGANIZATION FOR STANDARDIZATION • МЕЖДУНАРОДНАЯ ОРГАНИЗАЦИЯ ПО СТАНДАРТИЗАЦИИ • ORGANISATION INTERNATIONALE DE NORMALISATION

Metallic materials — Ductility testing — High speed compression test for porous and cellular metals

Essais mécaniques des métaux — Essais de ductilité — Essai de compression à haute vitesse des métaux poreux et cellulaires

ICS 77.040.10

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
https://standards.iteh.ai/catalog/standards/sist/22c5045a-40e7-b067-8737ade7133a/iso-17340-2014

To expedite distribution, this document is circulated as received from the committee secretariat. ISO Central Secretariat work of editing and text composition will be undertaken at publication stage.

Pour accélérer la distribution, le présent document est distribué tel qu'il est parvenu du secrétariat du comité. Le travail de rédaction et de composition de texte sera effectué au Secrétariat central de l'ISO au stade de publication.

THIS DOCUMENT IS A DRAFT CIRCULATED FOR COMMENT AND APPROVAL. IT IS THEREFORE SUBJECT TO CHANGE AND MAY NOT BE REFERRED TO AS AN INTERNATIONAL STANDARD UNTIL PUBLISHED AS SUCH.

IN ADDITION TO THEIR EVALUATION AS BEING ACCEPTABLE FOR INDUSTRIAL, TECHNOLOGICAL, COMMERCIAL AND USER PURPOSES, DRAFT INTERNATIONAL STANDARDS MAY ON OCCASION HAVE TO BE CONSIDERED IN THE LIGHT OF THEIR POTENTIAL TO BECOME STANDARDS TO WHICH REFERENCE MAY BE MADE IN NATIONAL REGULATIONS.

RECIPIENTS OF THIS DRAFT ARE INVITED TO SUBMIT, WITH THEIR COMMENTS, NOTIFICATION OF ANY RELEVANT PATENT RIGHTS OF WHICH THEY ARE AWARE AND TO PROVIDE SUPPORTING DOCUMENTATION.

© International Organization for Standardization, 2012

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
https://standards.iteh.ai/catalog/standards/sist/22c5045a-fd5f-40e7-b067-8737ade7133a/iso-17340-2014

Copyright notice

This ISO document is a Draft International Standard and is copyright-protected by ISO. Except as permitted under the applicable laws of the user's country, neither this ISO draft nor any extract from it may be reproduced, stored in a retrieval system or transmitted in any form or by any means, electronic, photocopying, recording or otherwise, without prior written permission being secured.

Requests for permission to reproduce should be addressed to either ISO at the address below or ISO's member body in the country of the requester.

ISO copyright office
Case postale 56 • CH-1211 Geneva 20
Tel. + 41 22 749 01 11
Fax + 41 22 749 09 47
E-mail copyright@iso.org
Web www.iso.org

Reproduction may be subject to royalty payments or a licensing agreement.

Violators may be prosecuted.

© ISO 2012 – All rights reserved

Contents

Page

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
https://standards.iteh.ai/catalog/standards/sist/22e5045a-fd5f-40e7-b067-8737ade7133a/iso-17340-2014
DRAFT 2013

© ISO 2002 – 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.

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.

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.

ISO nnn-n was prepared by Technical Committee ISO/TC 164, *Mechanical testing of metals*, Subcommittee SC 2, *Ductility testing*.

This second/third/... edition cancels and replaces the first/second/... edition (ISO nnn-n:19xx), [clause(s) / subclause(s) / table(s) / figure(s) / annex(es)] of which [has / have] been technically revised.

DRAFT ISO
iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standards: https://standards.iteh.ai/catalog/standards/sist/2c5045a-fd5f-40e7-b067-8737ade7133a/iso-17340-2015

© ISO 2002 – All rights reserved

Introduction

Porous and cellular metals have attractive properties due to their unique cell morphology. When they are used as impact energy absorbing components in automotive machines, knowledge of their high speed compressive properties is necessary for industrial design. The high speed compressive deformation behavior of porous and cellular metals is quite different from their static compressive properties. Testing methods for static compressive deformation are, therefore, insufficient for characterization of high speed compressive deformation. Standardization of a testing method for the high speed compressive behavior of porous and cellular metals is required.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
https://standards.iteh.ai/catalog/standards/sist/22c5045a-fd5f-40e7-b067-8737add7133a/iso-17340-2014
DRAFT 2003

© ISO 2002 – All rights reserved

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
https://standards.iteh.ai/catalog/standards/sist/22c5045a-fd5f-40e7-b067-8737ade7133a/iso-17340-2014

Metallic materials — Ductility testing — High speed compression test for porous and cellular metals

DRAFT 2013

1 Scope

This standard specifies methods for high speed compression testing, at room temperature, of porous and cellular metals having a porosity of 50 % or more. The speed range applicable to this test method shall be 0,1 m/s to 100 m/s (or 1 s^{-1} to 10^3 s^{-1} in terms of the initial strain rate when the specimen height is 100 mm).

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.

iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:

ISO 376, Metallic materials – Calibration of force - proving instruments used for the verification of uniaxial testing machines

ISO 717-1, Rounding rules related to single number ratings and single number quantities

ISO 7500-1, Metallic materials – Verification of static uniaxial testing machines -- Part 1: Tension/compression testing machines -- Verification and calibration of the force-measuring system

ISO 13314, Mechanical testing of metals – Ductility testing - Compression test for porous and cellular metals

3 Principle

This test consists of applying an impact force at test speeds between 0,1 m/s and 100 m/s to porous or cellular metals and measuring the compressive force and displacement for evaluation of their high-speed compressive deformation characteristics, such as plateau stress and energy absorption. Test methods that apply high speed compressive forces to porous and cellular metals are the drop weight impact test and servo-type high speed compression tests.

The drop weight impact test applies the compressive force by dropping a weight from a specified height. The test speed is controlled by the drop height. Due attention should be paid to the fact that the weight will be decelerated during the period of compressive deformation. When the drop height necessary to reach the specified test speed cannot be not obtained, application of an initial velocity to the weight is possible.

The servo-type high speed compression test applies the compressive force by a hydraulic or electric high speed servo mechanism. The test speed is changed by the servo control. The drive unit must be capable of following the test speed.

4 Terms and definitions

For the purposes of this document, the terms and definitions given in ISO 13314 and the following apply.

© ISO 2002 – All rights reserved

4.1
test speed
movement speed of the pressing jig, which applies the compressive force to the test piece, when the pressing jig contacts the test piece

4.2
initial strain rate
value derived by dividing the test speed by the initial height of the test piece

4.3
sampling frequency
frequency used to sample the measurement data per unit time

4.4
drop height
initial distance between the pressure application plane of the pressing jig and the top surface of the test piece in the drop weight impact testing machine

4.5
approach length
initial distance between the pressure application plane of the pressing jig and the top surface of the test piece in the servo-type high speed compression testing machine

5 Testing machine

5.1 Type of testing machine

The testing machines to be used for high speed compression testing of porous and cellular metals are the drop weight impact testing machine and the servo-type high speed compression testing machine.

5.2 Drop weight impact testing machine

An example of the basic composition of the drop weight impact testing machine is shown in Figure 1.

The drop weight impact testing machine consists of a weight, guide frame, pressing jig, load cell, displacement sensor, and absorber, as described below:

5.2.1 Weight

The weight shall drop vertically along the guide frame and shall be capable of applying the compressive force to the test piece.

The weight shall not be deformed by the impact when dropped and it should be possible to change the mass freely.

5.2.2 Pressing jig

The pressing jigs are located above and below the test piece and are used to apply the compressive force to the test piece. The pressing jig shall be of a construction such that it does not deform due to the compressive force, allowing correct transmission of the compressive force in the axial direction and preventing the action of the forces, such as bending stress, etc., other than the compressive force on the test piece.

The area of the pressing surfaces shall be sufficiently large to ensure an even application of the compressive force over the entire end surface of the test piece until compressive deformation is complete.

The pressing surfaces shall be polished flat and installed in such a manner that the center of the planes is aligned with the center line of the machine casing and the planes are parallel to each other.

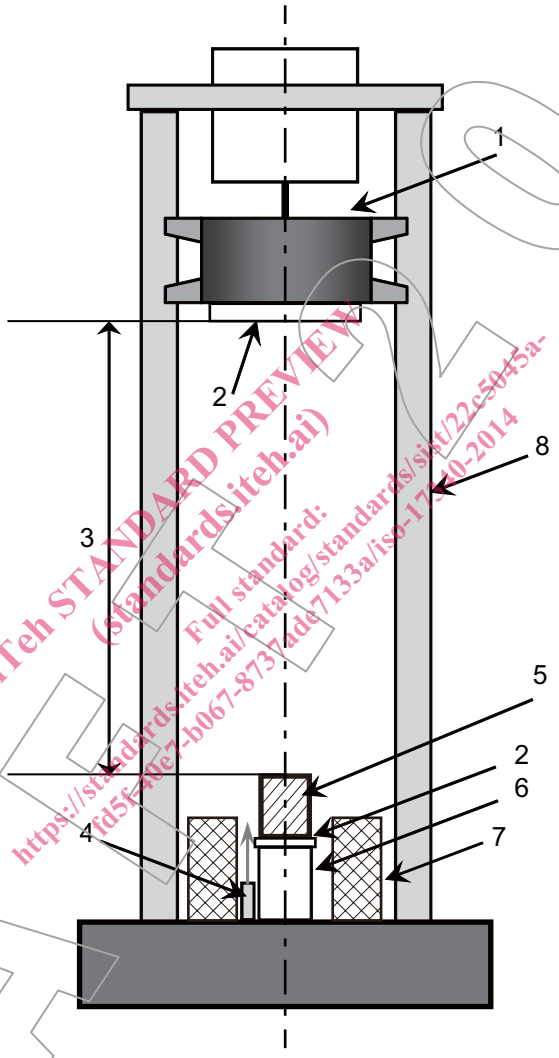
DRAFT 2013
iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:

© ISO 2002 – All rights reserved

5.2.3 Load cell

The load cell shall be capable of measuring the compressive force acting on the test piece. Calibration of the load cell shall be taken in accordance with ISO 376.

The resonant frequency and stiffness of the load cell shall be sufficiently high and the compressive force shall be measured to an accuracy of ± 1 %.



DRAFT 2015
iTeh STANDARD PREVIEW
(standards.iteh.ai)
Full standard:
https://standards.iteh.ai/catalog/standards/sist/22c5045a-fd5f-40e7-b067-8737ade7133a/iso-17340-2014

© ISO 2002 – All rights reserved

Key

1 weight
2 pressing jig
3 drop height
4 displacement sensor
5 test piece
6 load cell
7 absorber
8 guide frame

Figure 1 — Schematic of the drop weight impact testing machine

5.2.4 Displacement sensor

The displacement sensor shall be capable of measuring the travel of a drop weight during tests and shall be of a non-contact type to avoid inertia effects.

The response speed of the displacement sensor shall be higher than the test speed. Measurement with laser-type displacement sensors, optical displacement sensors, etc. with high accuracy is recommended.

5.2.5 Absorber

The absorber shall be capable of stopping the weight and preventing it from damaging the load cell after compressing the test piece to the specified height.

5.3 Servo-type high speed compression testing machine

Among servo-type high speed compression testing machines, the basic composition of the servo-hydraulic type high speed compression testing machine is shown in Figure 2.

The servo-type high speed compression testing machine consists of a pressing jig, load cell, displacement sensor, rupture pin, and stopper, as described below.

5.3.1 Pressing jig

The pressing jig shall be the same as described in 5.2.2.

5.3.2 Load cell

The load cell shall be the same as described in 5.2.3.

5.3.3 Displacement sensor

The displacement sensor shall be the same as described in 5.2.4.

5.3.4 Rupture pin

The rupture pin is a test force transmission part provided to protect the load cell and pressing jig from damage resulting from excessively large compressive forces.

DRAFT 2013
iTeh STANDARD PREVIEW (standards.iteh.ai)

© ISO 2002 – All rights reserved