INTERNATIONAL STANDARD

ISO 17340

Second edition
2020-05

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

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

Reference number
ISO 17340:2020(E)

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Published in Switzerland

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Foreword

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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).

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For an explanation of the voluntary nature of standards, 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 www.iso.org/iso/foreword.html.

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

This second edition cancels and replaces the first edition (ISO 17340:2014), of which it constitutes a minor revision. The changes compared to the previous edition are as follows:

— the title of ISO 7500-1 has been updated in Clause 2;

— a list of symbols and units has been added as Clause 4;

— information about the use of adhesives in 8.2 b) has been revised;

— minor editorial changes have been made to align with ISO/IEC Directives Part 2:2018.

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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 structures, knowledge of their high-speed compressive properties is necessary for industrial design. The high-speed compressive deformation behaviour 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 behaviour of porous and cellular metals is required.

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

1 Scope

This document 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 is 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 documents are referred to in the text in such a way that some or all of their content constitutes requirements 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 376, *Metallic materials — Calibration of force-proving instruments used for the verification of uniaxial testing machines*

ISO 7500-1, *Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification of the force-measuring system*

ISO 13314, *Mechanical testing of metals — Ductility testing — Compression test for porous and cellular metals*

ISO 80000-1, *Quantities and units — Part 1: General*

3 Terms and definitions

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

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

— ISO Online browsing platform: available at https://www.iso.org/obp

— IEC Electropedia: available at http://www.electropedia.org/

3.1
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

3.2
initial strain rate
value derived by dividing the test speed by the initial height of the test piece

3.3
sampling frequency
frequency used to sample the measurement data per unit time

3.4
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

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