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BSI Standards Publication

Metallic materials - Uniaxial creep testing in tension - Method of test

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National foreword

This British Standard is the UK implementation of EN ISO 204:2018. It supersedes BS EN ISO 204:2009, which is withdrawn.

The UK participation in its preparation was entrusted to Technical Committee ISE/101/1, Uniaxial testing.

A list of organizations represented on this committee can be obtained on request to its secretary.

This publication does not purport to include all the necessary provisions of a contract. Users are responsible for its correct application.

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Amendments/corrigenda issued since publication

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English Version

Metallic materials - Uniaxial creep testing in tension - Method of test (ISO 204:2018)

Matériaux métalliques - Essai de fluage uniaxial en
traction - Méthode d'essai (ISO 204:2018)

Metallische Werkstoffe - Einachsiger Zeitstandversuch
unter Zugbeanspruchung - Prüfverfahren (ISO
204:2018)

This European Standard was approved by CEN on 12 August 2018.

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 CEN-CENELEC Management Centre or to any CEN member.

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

CEN-CENELEC Management Centre: Rue de la Science 23, B-1040 Brussels

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European foreword

This document (EN ISO 204:2018) has been prepared by Technical Committee ISO/TC 164 "Mechanical testing of metals" in collaboration with Technical Committee ECISS/TC 101 "Test methods for steel (other than chemical analysis)" 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of an identical text or by endorsement, at the latest by April 2019, and conflicting national standards shall be withdrawn at the latest by April 2019.

Attention is drawn to the possibility that some of the elements of this document may be the subject of patent rights. CEN shall not be held responsible for identifying any or all such patent rights.

This document supersedes EN ISO 204:2009.

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

Endorsement notice

The text of ISO 204:2018 has been approved by CEN as EN ISO 204:2018 without any modification.

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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.

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 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 the following URL: www.iso.org/iso/foreword.html.

This document was prepared by Technical Committee ISO/TC 164, *Mechanical testing of metals*, Subcommittee SC 1, *Uniaxial testing*.

This third edition cancels and replaces the second edition (ISO 204:2009), which has been technically revised. The main changes compared to the previous edition are as follows:

- Some of the symbols have been changed to achieve harmonization with the ISO 6892 series.
- For the purpose of this document, the terms “fracture” and “rupture” are interchangeable.
- The term “indicated temperature”, T_i , has been replaced by “corrected measured temperature”, T_c , with errors from all sources being taken into account and any systematic errors having been corrected. The terms “elongation” and “extension” have been clarified and aligned with the terms used in the ISO 6892 series. Elongation refers to the test piece deformation measured manually either during deliberate test interruptions or after fracture, whilst extension is determined by continuous measurement using an extensometer.
- Some information relating to the calibration of thermocouples has been transferred from an informative annex into the main body of the document.
- Some changes have been made to [Table 1](#) and formulae have been amended using reference length, L_r .
- Equation E.1 (now [Formula C.1](#)) has been corrected.
- A new informative annex relating to computer compatible representation of standards has been added.

Any feedback or questions on this document should be directed to the user's national standards body. A complete listing of these bodies can be found at www.iso.org/members.html.

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Introduction

Creep is the phenomenon exhibited by materials which slowly deform when subjected to loading at elevated temperature. This document is concerned with the method used to measure such material behaviour.

Annexes are included concerning temperature measurement using thermocouples and their calibration, creep testing test pieces with circumferential V and blunt (Bridgman) notches, estimation of measurement uncertainty, methods of extrapolation of creep rupture life and information about computer compatible representation of standards.

NOTE 1 Information is still sought relating to the influence of off-axis loading or bending on the creep properties of various materials. Based on the future availability of quantitative data, consideration might be given as to whether the maximum amount of bending should be specified and an appropriate calibration procedure be recommended. The decision will need to be based on the availability of quantitative data^[43].

NOTE 2 Information concerning the benefit of standards being produced in a computer compatible format is given in [Annex F](#).

This document incorporates many recommendations developed through the European Creep Collaborative Committee (ECCC).

NOTE 3 Several different gauge lengths and reference lengths are specified in this document. These lengths reflect custom and practice used in different laboratories throughout the world. In some cases, the lengths are physically marked on the test piece as lines or ridges; in other cases, the length can be a virtual length based upon calculations to determine an appropriate length to be used for the determination of creep elongation. For some test pieces, L_r , L_o and L_e are the same length (see [3.1](#), [3.2](#) and [3.3](#)). "Extension" is used for uninterrupted creep test with continuous measurement of the increase of the length of the test piece by using an extensometer. "Elongation" is mainly used for interrupted creep test with the manual measurement of the increase of the length of the test piece.

NOTE 4 For many applications, the term "strain" is synonymous with extension.

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Metallic materials — Uniaxial creep testing in tension — Method of test

1 Scope

This document specifies the methods for

- a) uninterrupted creep tests with continuous monitoring of extension,
- b) interrupted creep tests with periodic measurement of elongation,
- c) stress rupture tests where normally only the time to fracture is measured,
- d) a test to verify that a predetermined time can be exceeded under a given force, with the elongation or extension not necessarily being reported.

NOTE A creep test can be continued until fracture has occurred or it can be stopped before fracture.

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 6892-1, *Metallic materials — Tensile testing — Part 1: Method of test at room temperature*

ISO 6892-2, *Metallic materials — Tensile testing — Part 2: Method of test at elevated temperature*

ISO 7500-2, *Metallic materials — Verification of static uniaxial testing machines — Part 2: Tension creep testing machines — Verification of the applied force*

ISO 9513, *Metallic materials — Calibration of extensometer systems used in uniaxial testing*

3 Terms and definitions

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

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

- IEC Electropedia: available at <http://www.electropedia.org/>
- ISO Online browsing platform: available at <https://www.iso.org/obp>

3.1 reference length

L_r

base length used for the calculation of either percentage elongation or percentage extension

Note 1 to entry: A method to calculate this value is given in [7.5](#).

3.2 original gauge length

L_o

length between gauge length marks on the test piece measured at ambient temperature before the test

Note 1 to entry: In general, $L_o \geq 5D$.