



**SLOVENSKI STANDARD**  
**SIST EN ISO 204:2023**

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**Kovinski materiali - Preskušanje nesoosnega lezenja pri nategu - Metoda preskušanja (ISO 204:2023)**

Metallic materials - Uniaxial creep testing in tension - Method of test (ISO 204:2023)

Metallische Werkstoffe - Einachsiger Zeitstandversuch unter Zugbeanspruchung - Prüfverfahren (ISO 204:2023)

Matériaux métalliques - Essai de fluage uniaxial en traction - Méthode d'essai (ISO 204:2023)

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## Metallic materials - Uniaxial creep testing in tension - Method of test (ISO 204:2023)

Matériaux métalliques - Essai de fluage uniaxial en  
traction - Méthode d'essai (ISO 204:2023)

Metallische Werkstoffe - Einachsiger Zeitstandversuch  
unter Zugbeanspruchung - Prüfverfahren (ISO  
204:2023)

This European Standard was approved by CEN on 25 June 2023.

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| Contents               | Page |
|------------------------|------|
| European foreword..... | 3    |

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## European foreword

This document (EN ISO 204:2023) has been prepared by Technical Committee ISO/TC 164 "Mechanical testing of metals" in collaboration with Technical Committee CEN/TC 459/SC 1 "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of an identical text or by endorsement, at the latest by February 2024, and conflicting national standards shall be withdrawn at the latest by February 2024.

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 204:2018.

Any feedback and questions on this document should be directed to the users' national standards body/national committee. A complete listing of these bodies can be found on the CEN website.

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## Endorsement notice

The text of ISO 204:2023 has been approved by CEN as EN ISO 204:2023 without any modification.



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

*Matériaux métalliques — Essai de fluage uniaxial en traction —  
Méthode d'essai*

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# Contents

Page

|   |           |
|---|-----------|
| Foreword.....   | v         |
| Introduction.....   | vi        |
| <b>1 Scope.....</b>   | <b>1</b>  |
| <b>2 Normative references.....</b>  | <b>1</b>  |
| <b>3 Terms and definitions.....</b>   | <b>1</b>  |
| <b>4 Symbols and designations.....</b>  | <b>6</b>  |
| <b>5 Principle.....</b>   | <b>7</b>  |
| <b>6 Apparatus.....</b>   | <b>8</b>  |
| 6.1 Testing machine.....  | 8         |
| 6.2 Extension and elongation measuring devices.....   | 8         |
| 6.2.1 Extension measuring device.....   | 8         |
| 6.2.2 Elongation measuring device.....  | 9         |
| 6.3 Heating device, temperature measuring equipment and calibration.....                                | 9         |
| 6.3.1 Permissible temperature deviations.....   | 9         |
| 6.3.2 Temperature measurement.....  | 10        |
| 6.3.3 Thermocouples.....  | 11        |
| 6.3.4 Calibration of the thermocouples.....   | 11        |
| <b>7 Test pieces.....</b>   | <b>12</b> |
| 7.1 Shape and dimensions.....   | 12        |
| 7.1.1 Shape and dimension of smooth test pieces.....  | 12        |
| 7.1.2 Shape and dimension of notched test pieces.....   | 13        |
| 7.2 Preparation.....  | 13        |
| 7.3 Determination of the original cross-sectional area.....   | 13        |
| 7.4 Marking of the original gauge length, $L_0$ .....   | 14        |
| 7.5 Determination of the reference length, $L_r$ .....  | 14        |
| <b>8 Test procedure.....</b>  | <b>15</b> |
| 8.1 Heating of the test piece.....  | 15        |
| 8.2 Application of the test force.....  | 15        |
| 8.3 Test interruptions.....   | 16        |
| 8.3.1 Planned interruptions of the test.....  | 16        |
| 8.3.2 Multiple test piece machine with several test pieces in line.....                                 | 16        |
| 8.3.3 Combined test.....  | 16        |
| 8.3.4 Accidental interruption of the test.....  | 16        |
| 8.4 Recording of temperature and elongation or extension.....   | 16        |
| 8.4.1 Temperature.....  | 16        |
| 8.4.2 Elongation and extension.....   | 16        |
| 8.4.3 Elongation-time curve or extension-time curve.....  | 17        |
| <b>9 Determination of results.....</b>  | <b>17</b> |
| <b>10 Test validity.....</b>  | <b>17</b> |
| <b>11 Accuracy of the results.....</b>  | <b>17</b> |
| 11.1 Expression of the results.....   | 17        |
| 11.2 Final uncertainty.....   | 18        |
| <b>12 Test report.....</b>  | <b>18</b> |
| <b>Annex A (informative) Information concerning drift of thermocouples.....</b>                         | <b>23</b> |
| <b>Annex B (informative) Information concerning methods of calibration of thermocouples.....</b>        | <b>26</b> |
| <b>Annex C (normative) Creep testing using test pieces with V or blunt circumferential notches.....</b> | <b>27</b> |

## ISO 204:2023(E)

|   |           |
|---|-----------|
| <b>Annex D (informative) Method of estimating the uncertainty of the measurement in accordance with the Guide to the expression of uncertainty in measurement (GUM)</b> ..... | <b>30</b> |
| <b>Annex E (informative) Representation of results and extrapolation</b> .....  | <b>36</b> |
| <b>Bibliography</b> .....   | <b>45</b> |

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[SIST EN ISO 204:2023](https://standards.iteh.ai/catalog/standards/sist/b21727b6-8e39-4176-9776-bede83f3e077/sist-en-iso-204-2023)

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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 document 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](http://www.iso.org/directives)).

ISO draws attention to the possibility that the implementation of this document may involve the use of (a) patent(s). ISO takes no position concerning the evidence, validity or applicability of any claimed patent rights in respect thereof. As of the date of publication of this document, ISO had not received notice of (a) patent(s) which may be required to implement this document. However, implementers are cautioned that this may not represent the latest information, which may be obtained from the patent database available at [www.iso.org/patents](http://www.iso.org/patents). ISO shall not be held responsible for identifying any or all such patent rights.

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This document was prepared by Technical Committee ISO/TC 164, *Mechanical testing of metals*, Subcommittee SC 1, *Uniaxial testing*, in collaboration with the European Committee for Standardization (CEN) Technical Committee CEN/TC 459/SC 1, *Test methods for steel (other than chemical analysis)*, in accordance with the Agreement on technical cooperation between ISO and CEN (Vienna Agreement).

This fourth edition cancels and replaces the third edition (ISO 204:2018), which has been technically revised.

The main changes are as follows:

- [Figure 1](#) has been corrected;
- symbols were revised;
- Formulas in [Table 1](#) have been removed;
- the informative annex relating to computer compatible representation of standards has been deleted;
- Bibliography has been updated.

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](http://www.iso.org/members.html).

**ISO 204:2023(E)****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 and methods of extrapolation of creep rupture life.

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 can 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<sup>[1]</sup>.

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

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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 terminology databases for use in standardization at the following addresses:

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

### 3.1 reference length

$L_r$

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

Note 1 to entry: 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,  $L_r$ ,  $L_0$  and  $L_e$  are the same length.

Note 2 to entry: A method to calculate this value is given in 7.5.

## ISO 204:2023(E)

### 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,  $L_o \geq 5D$ .

### 3.3 extensometer gauge length

$L_e$   
distance between the measuring points of the extensometer

### 3.4 parallel length

$L_c$   
length of the parallel reduced section of the test piece

### 3.5 final gauge length after fracture

$L_u$   
length between gauge length marks on the test piece measured after fracture, at ambient temperature, with the pieces carefully fitted back together with their axes in a straight line

### 3.6 original cross-sectional area

$S_o$   
cross-sectional area of the parallel length as determined at ambient temperature prior to testing

### 3.7 minimum cross-sectional area after fracture

$S_u$   
minimum cross-sectional area of the parallel length as determined at ambient temperature after fracture, with the pieces carefully fitted back together with their axes in a straight line

### 3.8 initial stress

$R_o$   
applied force divided by the original cross-section area,  $S_o$ , of the test piece

### 3.9 extension

$\Delta L_{et}$   
increase of extensometer gauge length,  $L_e$ , at time  $t$  and at test temperature

Note 1 to entry: "Extension" is used for uninterrupted creep test with continuous measurement of the increase of the length of the test piece by using an extensometer.

Note 2 to entry: For further information, see [6.2](#).

### 3.10 elongation

$\Delta L_{ot}$   
increase of original gauge length,  $L_o$ , at time  $t$

Note 1 to entry: "Elongation" is mainly used for interrupted creep test with the manual measurement of the increase of the length of the test piece.

Note 2 to entry: For further information, see [6.2](#).

### 3.11 percentage extension

$e$

extension at test temperature expressed as a percentage of the reference length,  $L_r$ , as given in [Formula \(1\)](#)

$$e = \frac{\Delta L_{et}}{L_r} \times 100 \quad (1)$$

Note 1 to entry: See [Figure 1](#).

### 3.12 percentage elongation

$A$

elongation expressed as a percentage of the reference length,  $L_r$ , as given in [Formula \(2\)](#)

$$A = \frac{\Delta L_{ot}}{L_r} \times 100 \quad (2)$$

### 3.13 percentage elastic extension

$e_e$

extension at test temperature expressed as a percentage of the reference length,  $L_r$ , which is proportional to the initial stress,  $R_0$

Note 1 to entry: This value can be calculated from the stress/percentage extension values during loading. See [8.4.2](#).

Note 2 to entry: See [Figure 1](#).

### 3.14 percentage initial total extension

$e_{ti}$

extension at test temperature expressed as a percentage of the reference length,  $L_r$ , at end of loading with the initial stress,  $R_0$

Note 1 to entry: See [Figure 1](#).

### 3.15 percentage initial plastic extension

$e_i$

extension at end of loading and at test temperature with the initial stress,  $R_0$ , expressed as a percentage of the reference length,  $L_r$ , and determined as the difference between the percentage initial total extension,  $e_{ti}$ , and the percentage elastic extension,  $e_e$ , as given in [Formula \(3\)](#)

$$e_i = e_{ti} - e_e \quad (3)$$

Note 1 to entry: See [Figure 1](#).

Note 2 to entry: This value represents the plastic extension during the loading phase.

### 3.16 percentage total extension

$e_t$

extension at the test force at time  $t$  and at test temperature, expressed as a percentage of the reference length,  $L_r$

Note 1 to entry: See [Figure 1](#).