SLOVENSKI STANDARD
oSIST prEN ISO 204:2008
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Kovinski materiali - Preskušanje nesoosnega lezenja pri nategu - Metoda preskušanja (ISO/DIS 204:2007)

Metallic materials - Uniaxial creep testing in tension - Method of test (ISO/DIS 204:2007)

Metallische Werkstoffe - Einachsiger Zeitstandversuch unter Zugbeanspruchung - Prüfverfahren (ISO/DIS 204:2007)

Matériaux métalliques - Essai de fluage uniaxial en traction - Méthode d'essai (ISO/DIS 204:2007)

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English Version

Metallic materials - Uniaxial creep testing in tension - Method of test (ISO/DIS 204:2007)

Matériaux métalliques - Essai de fluage uniaxial en traction - Méthode d'essai (ISO/DIS 204:2007)

Metallische Werkstoffe - Einachsiger Zeitstandversuch unter Zugbeanspruchung - Prüfverfahren (ISO/DIS 204:2007)

This draft European Standard is submitted to CEN members for second parallel enquiry. It has been drawn up by the Technical Committee ECISS/TC 1.

If this draft becomes a European Standard, 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.

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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.

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EUROPEAN COMMITTEE FOR STANDARDIZATION
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Foreword

This document (prEN ISO 204:2007) has been prepared by Technical Committee ISO/TC 164 "Mechanical testing of metals" in collaboration with Technical Committee ECISS/TC 1 “Steel - Mechanical testing” the secretariat of which is held by AFNOR.

This document is currently submitted to the second parallel Enquiry.

Endorsement notice

The text of ISO/DIS 204:2007 has been approved by CEN as a prEN ISO 204:2007 without any modification.

DRAFT INTERNATIONAL STANDARD ISO/DIS 204.2

ISO/TC **164**/SC **1** Secretariat: **AFNOR**

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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

[Revision of first edition (ISO 204:1997)]

ICS 77.040.10

ISO/CEN PARALLEL ENQUIRY

The CEN Secretary-General has advised the ISO Secretary-General that this ISO/DIS covers a subject of interest to European standardization. **In accordance with the ISO-lead mode of collaboration as defined in the Vienna Agreement, consultation on this ISO/DIS has the same effect for CEN members as would a CEN enquiry on a draft European Standard.** Should this draft be accepted, a final draft, established on the basis of comments received, will be submitted to a parallel two-month FDIS vote in ISO and formal vote in CEN.

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.

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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.

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 204 was prepared by Technical Committee ISO/TC 164, *Mechanical testing of metals*, Subcommittee SC 1, and by Technical Committee ECISS/TC ECISS/TC 1, *Steel testing - Mechanical testing* in collaboration.

This second edition cancels and replaces the first edition (EN ISO 204:1997), that has been technically revised.

Introduction

This Standard is an extensive revision of the first edition of EN ISO 204:1997 and incorporates many recommendations developed through the European Creep Collaborative Committee (ECCC).

New informative Annexes have been added concerning temperature measurement using thermocouples and their calibration, creep testing test pieces with circumferential Vee and blunt (Bridgman) notches, estimation of measurement uncertainty and methods of extrapolation of creep rupture life.

NOTE Information is sought relating to the influence of off-axis loading or bending on the creep properties of various materials. Consideration will be given at the next revision of this Standard as to whether the maximum amount bending should be specified and an appropriate calibration procedure be recommended. The decision will need to be based on the availability of quantitative data.

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

1 Scope

This International Standard specifies the method for the uninterrupted and interrupted creep tests and defines the properties of metallic materials which can be determined from these tests, in particular the creep elongation and the time of creep rupture, at a specified temperature.

The stress rupture test is also covered by this standard, as is the testing of notched test pieces.

NOTE In stress rupture testing elongation is not generally recorded during the test, only the time to failure under a given load, or to note that a predetermined time was exceeded under a given load.

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.

ISO 286-2, *ISO system of limits and fits — Part 2: Table of standard tolerances grades and limit deviations for holes and shafts. – check the number for this standard.*

ISO 783, *Metallic materials — Tensile testing method at elevated temperature.*

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

ISO 9513, *Metallic materials — Calibration of extensometers used in uniaxial testing.*

3 Terms and definitions

For the purposes of this International Standard, the following terms and definitions apply:

3.1
reference length (L_r)
base length used for the calculation of elongation

NOTE A method to calculate this value is given in 7.5.

3.2
original reference length (L_{ro})
reference length determined at ambient temperature before the test

3.3
final reference length (L_{ru})
reference length determined at ambient temperature after rupture, with the pieces carefully fitted back together with their axes in a straight line

3.4
original gauge length (L_o)
length between gauge length marks on the test piece measured at ambient temperature before the test

3.5
final gauge length after rupture (L_u)
length between gauge length marks on the test piece measured after rupture, at ambient temperature, with the pieces carefully fitted back together with their axes in a straight line

3.6
parallel length (L_c)
length of the parallel reduced section of the test piece

3.7
extensometer gauge length (L_e)
distance between the measuring points of extensometer

NOTE In some cases, $L_e = L_o$.

3.8
original cross-sectional area (S_o)
cross-sectional area of the parallel length as determined at ambient temperature prior to testing

3.9
minimum cross-sectional area after rupture (S_u)
minimum cross-sectional area of the parallel length as determined at ambient temperature after rupture, with the pieces carefully fitted back together with their axes in a straight line

3.10
initial stress (σ_o)
applied force divided by the original cross-sectional area (S_o) of the test piece

3.11
elongation (ΔL_r)
increase of the reference length (L_r)

NOTE see 6.2

3.12
percentage elongation (A)
elongation expressed as a percentage of the original reference length L_{ro}, see Figure 1

NOTE In the case of the terms for elongation in 3.10 (except A_u, in 3.10.6), the symbol "ε" may replace "*A*".

However, when "ε" is used, the following convention should apply:

ε % = percentage strain/elongation;

ε = absolute strain.

3.13
percentage initial plastic elongation (A_i)
non-proportional increase of the original reference length L_{ro} due to the application of the test force

3.14
percentage creep elongation (A_f)
increase in reference length at time t (ΔL_{rt}) at a specified temperature expressed as a percentage of the original reference length (L_{ro}):

$$A_f = \frac{\Delta L_{rt}}{L_{ro}} \times 100$$

NOTE 1 A_f may have the specified temperature (T) in Celsius degrees as superscript and s the initial stress (σ_o) in megapascals [1)] and time t (in hours) as subscript.

NOTE 2 By convention the beginning of creep elongation measurement is the time at which the initial stress (σ_o) is applied to the test piece (see Figure 1).

3.15
percentage plastic elongation (A_p)
non proportional increase of the original reference length (L_{ro}) at time t:

$$A_p = A_i + A_f$$

3.16
percentage anelastic elongation (A_k)
non-proportional decrease of the original reference length (L_{ro}) at time t due to unloading

3.17
percentage permanent elongation (A_{per})
total increase of the original reference length (L_{ro}) at time t determined after unloading:

$$A_{per} = A_p - A_k$$

3.17
percentage elongation after creep rupture (A_u)
permanent increase of the original reference length (L_{ro}) after rupture ($L_{ru} - L_{ro}$) expressed as a percentage of the original reference length (L_{ro}):

$$A_u = \frac{L_{ru} - L_{ro}}{L_{ro}} \times 100$$

NOTE A_u may have the specified temperature (T) in Celsius degrees as superscript and the initial stress (σ_o) in megapascals) as subscript.

3.18
percentage reduction of area after creep rupture (Z_u)
maximum change in cross-sectional area measured after rupture ($S_o - S_u$) expressed as a percentage of the original cross-sectional area (S_o):

$$Z_u = \frac{S_o - S_u}{S_o} \times 100$$

NOTE Z_u may have the specified temperature (T) in Celsius degrees as superscript and the initial stress (σ_o) in megapascals

3.19
creep elongation time (t_x)
time required for a strain test piece to obtain *a specified percentage creep elongation* (x) at the specified temperature (T) and the initial stress (σ_o)

EXAMPLE $t_{0,2}$

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1) 1 MPa = 1 N/mm^2.