SLOVENSKI STANDARD
SIST EN ISO 204:2011

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Nadomešča:

SIST EN 10291:2002

Kovinski materiali - Preskušanje nesoosnega lezenja pri nategu - Metoda preskušanja (ISO 204:2009)

Metallic materials - Uniaxial creep testing in tension - Method of test (ISO 204:2009)

Metallische Werkstoffe - Einachsiger Zeitstandversuch unter Zugbeanspruchung - Prüfverfahren (ISO :2009)

Matériaux métalliques - Essai de fluage uniaxial en traction - Méthode d'essai (ISO 204:2009)

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English Version

Metallic materials - Uniaxial creep testing in tension - Method of test (ISO 204:2009)

Matériaux métalliques - Essai de fluage uniaxial en traction - Méthode d'essai (ISO 204:2009)

Metallische Werkstoffe - Einachsiger Zeitstandversuch unter Zugbeanspruchung - Prüfverfahren (ISO 204:2009)

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Foreword

This document (EN ISO 204:2009) 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 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of an identical text or by endorsement, at the latest by December 2009, and conflicting national standards shall be withdrawn at the latest by December 2009.

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Endorsement notice

The text of ISO 204:2009 has been approved by CEN as a EN ISO 204:2009 without any modification.

INTERNATIONAL STANDARD

ISO 204

Second edition
2009-06-15

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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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.

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ISO 204 was prepared by Technical Committee ISO/TC 164, *Mechanical testing of metals*, Subcommittee SC 1, *Uniaxial testing*.

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

Introduction

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

New 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 International Standard 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 [39].

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 International 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 force.

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: Tables of standard tolerance grades and limit deviations for holes and shafts*

ISO 783 [1)], *Metallic materials — Tensile testing 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 extensometers used in uniaxial testing*

3 Terms and definitions

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

NOTE Several different gauge lengths and reference lengths are specified in this International Standard. 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 may 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 3.5).

1) To be revised by ISO 6892-2, *Metallic materials — Tensile testing — Part 2: Method of test at elevated temperature*.

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 for test pieces where the extensometer is attached to either ridges on the parallel length or to the shoulders of the test piece.

3.1.1
original reference length
L_{ro}
reference length determined at ambient temperature before the test

NOTE In general, $L_{ro} \geqslant 5D$.

3.1.2
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

3.2
original gauge length
L_o
length between gauge length marks on the test piece measured at ambient temperature before the test

NOTE 1 In general, $L_o \geqslant 5D$.

NOTE 2 L_o may also be used for the calculation of elongation.

3.3
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

3.4
parallel length
L_c
length of the parallel reduced section of the test piece

3.5
extensometer gauge length
L_e
distance between the measuring points of the extensometer

NOTE In some cases, $L_e = L_o$ and may also be used for the calculation of elongation.

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 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

3.8
initial stress
σ_o
applied force divided by the original cross-sectional area (S_o) of the test piece

3.9
elongation
ΔL_r
increase of the reference length (L_r)

NOTE See 6.2.

3.10
percentage elongation
A
elongation expressed as a percentage of the original reference length (L_{ro})

NOTE 1 See Figure 1.

NOTE 2 In the terms for elongation in 3.10 to 3.16, the symbol "ε" may replace "A".

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

ε % is the percentage strain or elongation;

ε is the absolute strain.

3.11
percentage initial plastic elongation
A_i
non-proportional increase of the original reference length (L_{ro}) due to the application of the test force

3.12
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}):

$$A_f = \frac{\Delta L_{rt}}{L_{ro}} \times 100 \tag{1}$$

NOTE 1 A_f may have the specified temperature (T) in degrees Celsius (°C) as superscript and the initial stress (σ_o) in megapascals [2)] 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).

NOTE 3 Suffix f originates from "fluage", "creep" in French.

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