SLOVENSKI STANDARD
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Kovinski materiali - Natezni preskus - 1. del: Metoda preskušanja pri sobni temperaturi (ISO 6892-1:2019)

Metallic materials - Tensile testing - Part 1: Method of test at room temperature (ISO 6892-1:2019)

Metallische Werkstoffe - Zugversuch - Teil 1: Prüfverfahren bei Raumtemperatur (ISO 6892-1:2019)

Matériaux métalliques - Essai de traction - Partie 1: Méthode d'essai à température ambiante (ISO 6892-1:2019)

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Metallic materials - Tensile testing - Part 1: Method of test at room temperature (ISO 6892-1:2019)

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Metallische Werkstoffe - Zugversuch - Teil 1: Prüfverfahren bei Raumtemperatur (ISO 6892-1:2019)

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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 6892-1:2019) 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of an identical text or by endorsement, at the latest by June 2020, and conflicting national standards shall be withdrawn at the latest by June 2020.

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.

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Endorsement notice

The text of ISO 6892-1:2019 has been approved by CEN as EN ISO 6892-1:2019 without any modification.

INTERNATIONAL STANDARD

ISO 6892-1

Third edition
2019-11

Metallic materials — Tensile testing —

Part 1:
Method of test at room temperature

Matériaux métalliques — Essai de traction —

Partie 1: Méthode d'essai à température ambiante

Reference number
ISO 6892-1:2019(E)

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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).

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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 1, *Uniaxial testing*.

This third edition cancels and replaces the second edition (ISO 6892-1:2016), of which it constitutes a minor revision. The changes compared to the previous edition are as follows:

— correction of the title of a standard in Clause 2;

— correction of the designation "coefficient of determination" ("coefficient of determination" instead of "coefficient of correlation");

— correction of Formula (1);

— wording in 10.3.2.1;

— wording in the key of Figure 9;

— wording in Table B.2;

— wording in Table D.3;

— correction of the references.

A list of all parts in the ISO 6892 series can be found on the ISO website.

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.

Introduction

During discussions concerning the speed of testing in the preparation of ISO 6892, it was decided to recommend the use of strain rate control in future revisions.

In this document, there are two methods of testing speeds available. The first, method A, is based on strain rates (including crosshead separation rate) and the second, method B, is based on stress rates. Method A is intended to minimize the variation of the test rates during the moment when strain rate sensitive parameters are determined and to minimize the measurement uncertainty of the test results. Therefore, and out of the fact that often the strain rate sensitivity of the materials is not known, the use of method A is strongly recommended.

NOTE In what follows, the designations “force” and “stress” or “extension”, “percentage extension”, and “strain”, respectively, are used on various occasions (as figure axis labels or in explanations for the determination of different properties). However, for a general description or point on a curve, the designations “force” and “stress” or “extension”, “percentage extension”, and “strain”, respectively, can be interchanged.

Metallic materials — Tensile testing —

Part 1:
Method of test at room temperature

1 Scope

This document specifies the method for tensile testing of metallic materials and defines the mechanical properties which can be determined at room temperature.

NOTE Annex A contains further recommendations for computer controlled testing machines.

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

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:

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

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

3.1
gauge length
L
length of the parallel portion of the test piece on which elongation is measured at any moment during the test

3.1.1
original gauge length
L_o
length between *gauge length* (3.1) marks on the test piece measured at room temperature before the test

3.1.2
final gauge length after fracture
L_u
length between *gauge length* (3.1) marks on the test piece measured after rupture, at room temperature, the two pieces having been carefully fitted back together so that their axes lie in a straight line

3.2
parallel length
L_c
length of the parallel reduced section of the test piece

Note 1 to entry: The concept of parallel length is replaced by the concept of distance between grips for unmachined test pieces.

3.3
elongation
increase in the *original gauge length* (3.1.1) at any moment during the test

3.4
percentage elongation
elongation (3.3) expressed as a percentage of the *original gauge length* (3.1.1)

3.4.1
percentage permanent elongation
increase in the *original gauge length* (3.1.1) of a test piece after removal of a specified stress, expressed as a percentage of the *original gauge length* (3.1.1)

3.4.2
percentage elongation after fracture
A
permanent *elongation* (3.3) of the gauge length after fracture ($L_u - L_o$), expressed as a percentage of the *original gauge length* (3.1.1)

Note 1 to entry: For further information, see 8.1.

3.5
extensometer gauge length
L_e
initial gauge length of the extensometer used for measurement of *extension* (3.6)

Note 1 to entry: For the determination of several properties which are based (partly or complete) on extension, e. g. R_p, A_e or A_g, the use of an extensometer is mandatory.

Note 2 to entry: For further information, see 8.3.

3.6
extension
increase in the *extensometer gauge length* (3.5), at any moment during the test

3.6.1
percentage extension
strain
e
extension (3.6) expressed as a percentage of the *extensometer gauge length* (3.5)

Note 1 to entry: e is commonly called engineering strain.

3.6.2
percentage permanent extension
increase in the *extensometer gauge length* (3.5), after removal of a specified *stress* (3.10) from the test piece, expressed as a percentage of the extensometer gauge length

3.6.3
percentage yield point extension
A_e
<discontinuous yielding materials> *extension* (3.6) between the start of yielding and the start of uniform work-hardening, expressed as a percentage of the *extensometer gauge length* (3.5)

Note 1 to entry: See Figure 7.

3.6.4
percentage total extension at maximum force
A_{gt}
total *extension* (3.6) (elastic extension plus plastic extension) at maximum force, expressed as a percentage of the *extensometer gauge length* (3.5)

Note 1 to entry: See Figure 1.

3.6.5
percentage plastic extension at maximum force
A_g
plastic *extension* (3.6) at maximum force, expressed as a percentage of the *extensometer gauge length* (3.5)

Note 1 to entry: See Figure 1.

3.6.6
percentage total extension at fracture
A_t
total *extension* (3.6) (elastic extension plus plastic extension) at the moment of fracture, expressed as a percentage of the *extensometer gauge length* (3.5)

Note 1 to entry: See Figure 1.

3.7
testing rate
rate (resp. rates) used during the test

3.7.1
strain rate
$\dot{e}_{L_e}$
increase of strain, measured with an extensometer, in *extensometer gauge length* (3.5), per time

3.7.2
estimated strain rate over the parallel length
$\dot{e}_{L_c}$
value of the increase of strain over the *parallel length* (3.2) of the test piece per time based on the *crosshead separation rate* (3.7.3) and the parallel length of the test piece

3.7.3
crosshead separation rate
v_c
displacement of the crossheads per time

3.7.4
stress rate
$\dot{R}$
increase of *stress* (3.10) per time

Note 1 to entry: Stress rate is only used in the elastic part of the test (method B) (see also 10.3.3).

