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Metallic materials - Tensile testing - Part 2: Method of test at elevated temperature (ISO/DIS 6892-2:2025)

Metallische Werkstoffe - Zugversuch - Teil 2: Prüfverfahren bei erhöhter Temperatur (ISO/DIS 6892-2:2025)

Matériaux métalliques - Essai de traction - Partie 2: Méthode d'essai à température élevée (ISO/DIS 6892-2:2025)

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Part 2: Method of test at elevated temperature

Matériaux métalliques — Essai de traction —

Partie 2: Méthode d'essai à température élevée

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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 second edition cancels and replaces the first edition (ISO 6892-2:2011), of which it constitutes a minor revision.

The main changes compared to the previous edition are as follows:

— a note has been added after the first sentence of 10.2.1;

— some references to subclauses of ISO 6892-1 have been deleted.

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

Introduction

In this document, two methods of testing speeds are described. The first, Method A, is based on strain rates (including crosshead separation rate) with narrow tolerances (±20 %) and the second, Method B, is based on conventional strain rate ranges and tolerances. 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.

The influence of the testing speed on the mechanical properties, determined by the tensile test, is normally greater at an elevated temperature than at room temperature.

Traditionally, mechanical properties determined by tensile tests at elevated temperatures have been determined at a slower strain or stressing rate than at room temperature. This document recommends the use of slow strain rates but, in addition, higher strain rates are permitted for particular applications, such as comparison with room temperature properties at the same strain rate.

During discussions concerning the speed of testing in the preparation of this document, it was decided to consider deleting the stress rate method in future revisions.

Metallic materials — Tensile testing —

Part 2: Method of test at elevated temperature

WARNING — This document calls for the use of substances and/or procedures that can be injurious to health if adequate safety measures are not taken. This document does not address any health hazards, safety or environmental matters associated with its use. It is the responsibility of the user of this document to establish appropriate health, safety and environmentally acceptable practices.

1 Scope

This document specifies a method of tensile testing of metallic materials at temperatures higher than room temperature.

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 7500-1, *Metallic materials — Calibration and verification of static uniaxial testing machines — Part 1: Tension/compression testing machines — Calibration and verification 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 terms and definitions given in ISO 6892-1 apply with the following exceptions and supplements.

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

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

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

In general, all test piece geometries/dimensions are based on measurements taken at room temperature. The exception may be the extensometer gauge length (see 3.3 and 10.2.2).

NOTE The following properties are typically determined at elevated temperature unless other properties defined in ISO 6892-1 are required by relevant specifications or agreement:

— proof strength, plastic extension (R_p);

— tensile strength (R_m);

— percentage elongation after fracture (A);

— percentage reduction of area (Z).

3.1
original gauge length
L_o
Distance between gauge length marks on the test piece measured at room temperature before heating of the test piece and before application of force

3.2
percentage elongation after fracture
A
permanent elongation at room temperature of the gauge length after fracture ($L_u - L_o$)

Note 1 to entry: It is expressed as a percentage of the *original gauge length (L_o)* (3.1).

Note 2 to entry: For further details, see ISO 6892-1.

3.3
extensometer gauge length
L_e
length within the parallel portion of the test piece used for the measurement of *extension* (3.4) by means of an extensometer

3.4
extension
increase in the *extensometer gauge length (L_e)* (3.3) at a given moment during the test

3.5
percentage extension
extension (3.4) expressed as a percentage of the *extensometer gauge length (L_e)* (3.3)

3.6
percentage reduction of area
Z
maximum change in cross-sectional area which has occurred during the test ($S_o - S_u$)

Note 1 to entry: It is expressed as a percentage of the original cross-sectional area (S_o), where S_o and S_u are calculated from the dimensions at room temperature.

3.7
stress
R
force at any moment during the test divided by the original cross-sectional area (S_o) of the test piece

Note 1 to entry: All stresses referred to in this document are engineering stresses, calculated using the cross-sectional area of the test piece derived from dimensions measured at room temperature.

3.8
soaking time
t_s
time taken to stabilize the temperature of the test piece prior to mechanical loading

4 Symbols and designations

ISO 6892-1 provides an extensive listing of symbols and their related designations.

The additional symbols used in this document are given in Table 1.