



# **Metallic materials — Tensile testing — Method of test at elevated temperature**



AS 2291:2020

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- Bureau of Steel Manufacturers of Australia
- Materials Australia
- National Association of Testing Authorities Australia
- University of Technology Sydney
- Weld Australia

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## Preface

This Test Method was prepared by the Standards Australia Committee MT-006, Mechanical Testing Of Metals to supersede AS 2291—2007, *Metallic materials — Tensile testing at elevated temperatures*.

The objective of this Test Method is to specify a method of tensile testing of metallic materials at temperatures higher than room temperature.

This Test Method is identical with, and has been reproduced from, ISO 6892-2:2018, *Metallic materials — Tensile testing — Part 2: Method of test at elevated temperature*.

As this document has been reproduced from an International Test Method, a full point substitutes for a comma when referring to a decimal marker.

Australian or Australian/New Zealand Standards that are identical adoptions of international normative references may be used interchangeably. Refer to the online catalogue for information on specific Standards.

The terms “normative” and “informative” are used in Standards to define the application of the appendices or annexes to which they apply. A “normative” appendix or annex is an integral part of a Standard, whereas an “informative” appendix or annex is only for information and guidance.

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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](http://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](http://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](http://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 ( $\pm 20\%$ ) 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.

## NOTES

# Australian Standard®

## Metallic materials — Tensile testing — 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 <http://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 generally not determined at elevated temperature unless required by relevant specifications or agreement:

- permanent set strength ( $R_T$ );
- percentage permanent elongation;
- percentage permanent extension;
- percentage yield point extension ( $A_e$ );
- percentage total extension at maximum force ( $A_{gt}$ );
- percentage plastic extension at maximum force ( $A_g$ );
- percentage total extension at fracture ( $A_T$ ).