

Australian Standard[®]

**Metallic materials—Tensile testing at
elevated temperatures**

STANDARDS
Australia



This Australian Standard® was prepared by Committee MT-006, Mechanical Testing of Metals. It was approved on behalf of the Council of Standards Australia on 19 January 2007. This Standard was published on 20 February 2007.

The following are represented on Committee MT-006:

- Australian Railway Association
 - Bureau of Steel Manufacturers of Australia
 - CSIRO National Measurement Laboratory
 - CSIRO Telecommunications and Industrial Physics
 - Institute of Materials Engineering Australia Limited
 - National Association of Testing Authorities Australia
-

This Standard was issued in draft form for comment as DR 6294.

Standards Australia wishes to acknowledge the participation of the expert individuals that contributed to the development of this Standard through their representation on the Committee and through public comment period.

Keeping Standards up-to-date

Australian Standards® are living documents that reflect progress in science, technology and systems. To maintain their currency, all Standards are periodically reviewed, and new editions are published. Between editions, amendments may be issued.

Standards may also be withdrawn. It is important that readers assure themselves they are using a current Standard, which should include any amendments that may have been published since the Standard was published.

Detailed information about Australian Standards, drafts, amendments and new projects can be found by visiting www.standards.org.au

Standards Australia welcomes suggestions for improvements, and encourages readers to notify us immediately of any apparent inaccuracies or ambiguities. Contact us via email at mail@standards.org.au, or write to Standards Australia, GPO Box 476, Sydney, NSW 2001.

STANDARDS AUSTRALIA

RECONFIRMATION

OF

AS 2291—2007

Metallic materials—Tensile testing at elevated temperatures

RECONFIRMATION NOTICE

Technical Committee MT-009 has reviewed the content of this publication and in accordance with Standards Australia procedures for reconfirmation, it has been determined that the publication is still valid and does not require change.

Certain documents referenced in the publication may have been amended since the original date of publication. Users are advised to ensure that they are using the latest versions of such documents as appropriate, unless advised otherwise in this Reconfirmation Notice.

Approved for reconfirmation in accordance with Standards Australia procedures for reconfirmation on 20 March 2017.

The following are represented on Technical Committee MT-009:

Australasian Institute of Surface Finishing
Australian Chamber of Commerce and Industry
Australian Industry Group
Australian Steel Institute
Bureau of Steel Manufacturers of Australia
Galvanizers Association of Australia
Galvanizing Association of New Zealand
New Zealand Metal Roofing Manufacturers

NOTES

Currently in preview, click buy full vers.

Australian Standard[®]

**Metallic materials—Tensile testing at
elevated temperatures**

Originally published as AS 2291—1979.
Second edition 2007.

COPYRIGHT

© Standards Australia

All rights are reserved. No part of this work may be reproduced or copied in any form or by any means, electronic or mechanical, including photocopying, without the written permission of the publisher.

Published by Standards Australia, GPO Box 476, Sydney, NSW 2001, Australia

ISBN 0 7337 8035 0

PREFACE

This Standard was prepared by Standards Australia Committee MT-006, Mechanical Testing of Metals to supersede AS 2291—1979, *Methods for the tensile testing of metals at elevated temperatures*. The Committee decided to change the title of the Standard to align with the title used for AS 1391. The title was changed to *Metallic materials—Tensile testing at elevated temperatures*.

The objective of this edition is to align more closely with ISO 783:1999, *Metallic materials—Tensile testing at elevated temperature*.

During this preparation of this Standard, cognisance was taken of the following Standards:

AS

- 1391 Metallic materials—Tensile testing at ambient temperature
- 1545 Methods for the calibration and grading of extensometers

ISO

- 377 Steel and steel products—Location and preparation of samples and test pieces for mechanical testing
- 783 Metallic materials—Tensile testing at elevated temperatures
- 3785 Metallic materials—Designation of test specimen types in relation to product texture

This Standard is one of a series of Standards covering the range of tensile testing methods. The series comprises the following:

AS

- 1391 Metallic materials—Tensile testing at ambient temperature
- 1545 Methods for the calibration and grading of extensometers
- 1855 Methods for the determination of transverse properties of round steel pipes
- 2291 Metallic materials—Tensile testing at elevated temperatures (this Standard)
- 2346 Methods for the determination of uniform elongation in sheet and strip metals
- 2403 Method for the measurement of plastic strain ‘r’ of sheet and strip metals

The terms ‘normative’ and ‘informative’ have been used in this Standard to define the application of the appendix to which they apply. A ‘normative’ appendix is an integral part of a Standard, whereas an ‘informative’ appendix is only for information and guidance.

CONTENTS

	<i>Page</i>
1 SCOPE.....	4
2 REFERENCED DOCUMENTS.....	4
3 DEFINITIONS.....	4
4 SYMBOLS AND DESIGNATIONS.....	7
5 PRINCIPLE.....	9
6 APPARATUS.....	9
7 TEST PIECE.....	11
8 TEST CONDITIONS.....	12
9 PROCEDURE.....	13
10 RECORD OF RESULTS.....	15
11 ACCURACY OF THE RESULTS.....	16
12 TEST REPORT.....	16
13 FORCE-EXTENSION DIAGRAMS.....	17
APPENDICES	
A TYPES OF TEST PIECE TO BE USED FOR THIN PRODUCTS: SHEETS, STRIPS AND FLATS BETWEEN 0.1 mm AND 3 mm THICK.....	23
B TYPES OF TEST PIECE TO BE USED FOR WIRE, BARS AND SECTIONS WITH A DIAMETER OR THICKNESS < 4 mm.....	26
C TYPES OF TEST PIECE TO BE USED FOR SHEETS AND FLATS OF THICKNESS ≥ 3 mm AND WIRE, BARS AND SECTIONS OF DIAMETER OR THICKNESS ≥ 4 mm.....	27
D TYPES OF TEST PIECE TO BE USED FOR TUBES.....	30
E DESIGNATION OF TEST PIECE AXES.....	32
F LOCATION AND PREPARATION OF SAMPLES AND TEST PIECES.....	36
G MEASUREMENT OF PERCENTAGE ELONGATION AFTER FRACTURE BASED ON SUBDIVISION OF THE ORIGINAL GAUGE LENGTH.....	46

STANDARDS AUSTRALIA

Australian Standard

Metallic materials—Tensile testing at elevated temperatures

1 SCOPE

This Standard specifies the method by which a test piece of metal is strained in uni-axial tension at elevated temperature in order to determine one or more of its short-time tensile properties. It defines the properties to be determined and the terms used in describing tests and test pieces. It specifies the dimensions of standard test pieces, temperature requirements and method of tensile testing.

2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS

- 1545 Methods for the calibration and grading of extensometers
1654 ISO system of limits and fits
1654.2 Part 2: Tables of standard tolerance grades and limit deviations for holes and shafts
2193 Calibration and classification of force-measuring systems

ISO

- 2566 Steel—Conversion of elongation values
2566-1 Part 1: Carbon and low alloy steels
2566-2 Part 2: Austenitic steels

ASTM

- E1012-05 Standard practice for verification of test frame and specimen alignment under tensile and compressive axial force application

3 DEFINITIONS

For the purpose of this Standard, the following definitions apply.

3.1 Elongation

Increase in the original gauge length (L_0) at any moment during the test (see Figure 1).

3.2 Engineering stress

At any moment during the test, force divided by the original cross-sectional area (S_0) of the test piece.

3.3 Extensometer gauge length (L_e)

Length of the parallel portion of the test piece used for the measurement of extension by means of an extensometer.

NOTE: It is recommended that for measurement of yield and proof strength parameters, L_e should span as much of the parallel length of the test piece as possible. Ideally, as a minimum, L_e should be greater than $0.50L_0$ but less than $0.9L_0$. This should ensure that the extensometer detects all yielding events that occur in the test piece. It is further recommended that for measurement of parameters 'at' or 'after' maximum force, L_e is approximately equal to L_0 .

3.4 Final gauge length (L_u)

Gauge length after rupture of the test piece.