AS 1545—1976
Reconfirmed 2017

Australian Standard®

# METHODS FOR THE CALIBRATION AND GRADING OF EXTENSOMETERS

The following scientific, industrial and governmental organizations and departments were officially represented on the committee entrusted with the preparation of this standard:

Aluminium Development Council
Associated Chambers of Manufactures of Australia
Australian Institute of Metals
Bureau of Steel Manufacturers of Australia
Department of Manufacturing Industry
Materials Research Laboratories—Department of Defence
Metal Trades Industry Association of Australia
National Association of Testing Authorities
National Measurement Laboratory
Railways of Australia Committee
Society of Automotive Engineers—Australasia
Universities

---

This standard, prepared by Committee MT/6, Mechanical Testing of Metals, was approved by the Metals Standards Board on behalf of the Council of the Standards Association of Australia on 18 June 1975, and was published on 1 May 1976.

---

***Review of Australian Standards.*** *To keep abreast of progress in industry, Australian Standards are subject to periodic review and are kept up to date by the issue of amendments or new editions as necessary. It is important therefore that Standards users ensure that they are in possession of the latest edition, and any amendments thereto.*

*Full details of all Australian Standards and related publications will be found in the Standards Australia Catalogue of Publications; this information is supplemented each month by the magazine 'The Australian Standard', which subscribing members receive, and which gives details of new publications, new editions and amendments, and of withdrawn Standards.*

*Suggestions for improvements to Australian Standards, addressed to the head office of Standards Australia, are welcomed. Notification of any inaccuracy or ambiguity found in an Australian Standard should be made without delay in order that the matter may be investigated and appropriate action taken.*

---

*This standard was issued in draft form for public review as DR 73062.*

STANDARDS AUSTRALIA

# RECONFIRMATION
# OF
# AS 1545—1976
# Methods for the calibration and grading of extensometers

## 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

AS 1545—1976

Australian Standard®

# METHODS FOR THE CALIBRATION AND GRADING OF EXTENSOMETERS

First published . . . . . 1976

PUBLISHED BY STANDARDS AUSTRALIA
(STANDARDS ASSOCIATION OF AUSTRALIA)
1 THE CRESCENT, HOMEBUSH, NSW 2140

ISBN 0 7262 0774 8

# PREFACE

This standard was prepared by the Association's Committee on Mechanical Testing of Metals, under the direction of the Metals Standards Board, to apply to extensometers used in the testing of metals but it may be used, where appropriate, for extensometers associated with tests on other materials.

The widespread use of extensometers of various types has necessitated the preparation of this standard, which describes methods and procedures for the calibration of these instruments, establishes the requirements for calibrating devices, and grades the extensometers in terms of gauge length, readability, repeatability and accuracy of indicated extension.

The standard has been based on BS 3846.* Significant modifications, however, include the omission of the method of calibration by means of elastic devices and the omission of the requirements for Grade A extensometers. Grades B to F still correspond respectively to Grades B to F in BS 3846 in regard to accuracy and repeatability of indicated extension. The requirements for gauge length and readability of indicated extension have been modified and special requirements for multirange extensometers have been included.

The standard unifies methods for calibrating extensometers at room temperature. It is intended for use by calibrating authorities and also by committees responsible for the preparation or revision of standards covering methods of mechanical testing in which the measurement of strain is required.

This standard requires reference to the following standards:

| | |
|---|---|
| AS 1457 | Gauge Blocks and Accessories (Metric Units) |
| AS B80 | Dial Gauges for Linear Measurement |
| AS B140 | Micrometer Heads |

* BS 3846, Methods for the Calibration and Grading of Extensometers for Testing of Metals.

# CONTENTS

SECTION 1. SCOPE AND GENERAL

1.1 Scope . . . . . 4
1.2 Definitions . . . . . 4
1.3 Principle of Calibration . . . . . 6

SECTION 2. GRADING OF EXTENSOMETERS

2.1 General . . . . . 7
2.2 Requirements for Grading . . . . . 7
2.3 Gauge Length to be Used during Calibration and when Testing Materials . . . . . 7
2.4 Magnification Factor . . . . . 8
2.5 Assessment of Calibration . . . . . 8

SECTION 3. CALIBRATION OF EXTENSOMETERS

3.1 General . . . . . 10
3.2 Readability of Indicated Extension . . . . . 10
3.3 Measurement of Gauge Length . . . . . 10
3.4 Calibration for Indicated Extension . . . . . 11
3.5 Record of Results . . . . . 13
3.6 Assessment of Results . . . . . 13
3.7 Report of Calibration . . . . . 14
3.8 Frequency of Calibration . . . . . 15

APPENDICES

A Notes and Recommendations . . . . . 16
B Requirements for Calibrating Devices . . . . . 17
C Grading Requirements for Extensometers . . . . . 20

STANDARDS ASSOCIATION OF AUSTRALIA

# Australian Standard

# METHODS FOR THE CALIBRATION AND GRADING OF EXTENSOMETERS

## SECTION 1. SCOPE AND GENERAL

**1.1 SCOPE.** This standard deals with the calibration at room temperature and grading of extensometers used in tension and compression testing. (See Appendix A regarding the use of extensometers at other than room temperature.) It defines the terms used and describes the standard method of calibration; the requirements for calibrating devices are stated. Extensometers are graded in terms of repeatability of gauge length, and readability, repeatability and accuracy of indicated extension.

Instructions for the issue of reports of calibration are included together with recommendations on certain constructional features of extensometers and the use of calibrating equipment.

**1.2 DEFINITIONS.** For the purpose of this standard the following definitions apply:

**1.2.1 Extensometer** — a device used for determining extension and hence strain. It comprises an extension sensing element and a readout system.

NOTES:
1. The readout may be in units of length or in strain, or in arbitrary units.
2. See also definition of indicated extension.
3. An extensometer may measure on one side or on opposite sides of a test piece. Where the latter type does not average the readings, it is hereinafter referred to as a 'dual extensometer'.

**1.2.2 Extensometer gauge length** — the initial length at room temperature used for the measurement of extension.

NOTES:
1. The extensometer gauge length is hereinafter referred to as the 'gauge length'.
2. Distinction is made between nominal and assigned values of extensometer gauge length (refer to Clause 2.3).

**1.2.3 Repeatability of gauge length** — the difference between the highest and lowest values obtained when repeated measurements of the gauge length are made.

**1.2.4 Displacement** — a change in length brought about by the calibrating device and as measured by that device.