AS 2193—2005
(Incorporating Amendment No. 1)
Reconfirmed 2017

Australian Standard®

Calibration and classification of force-measuring systems

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 2 March 2005. This Standard was published on 18 March 2005.

The following are represented on Committee MT-006:

- Australasian Railway Association
- Bureau of Steel Manufacturers of Australia
- Institute of Materials Engineering Australasia
- National Association of Testing Authorities
- National Measurement Institute

This Standard was issued in draft form for comment as DR 04517.

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.

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STANDARDS AUSTRALIA

RECONFIRMATION
OF
AS 2193—2005
Calibration and classification of force-measuring systems

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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.

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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

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PREFACE

This Standard was prepared by the Standards Australia Committee MT-006, Mechanical Testing of Metals, to supersede AS 2193—2002, *Calibration and classification of force-measuring systems*.

This Standard incorporates Amendment No. 1 (August 2006). The changes required by the Amendment are indicated in the text by a marginal bar and amendment number against the clause, note, table, figure or part thereof affected.

The objective of this revision is to introduce a specification for calibrating load rings and similar force measuring devices.

During the preparation of this edition, cognizance was taken of the following Standards:

ISO
376 Metallic materials—Calibration of force-proving instruments used for the verification of uniaxial testing machines

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

ASTM
E74 Standard practice of calibration of working force standards for verifying the load indication of testing machines

AS ISO/IEC
17025 General requirements for the competence of testing and calibration laboratories

ISO
GUM Guide to the Expression of Uncertainty in Measurement

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.

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FOREWORD

Calibration of working force standards is performed in either primary or secondary force standardizing machines by applying forces of known magnitude and uncertainty and deriving a mathematical relationship between applied force and instrument readings. The estimation of the uncertainty associated with this mathematical relationship is included in the procedure.

Calibration of force-measuring systems comprises a comparison between indicated and applied forces of known magnitude and uncertainty by means of suitable working force standards.

Calibration includes an assessment of readability, repeatability and accuracy of the indicated force, the assignment of class or classes and the issue of a report.

Force-measuring systems referred to in this Standard are those associated with force-testing machines or any other machinery or instruments where force application is measured. In the case of testing machines, they may be classified as tension or compression machines depending on the mode of straining applied to the test piece. Some machines have provision for more than one mode of straining.

It is necessary for machines and force-measuring systems to be maintained in good working order and condition. Regular servicing is recommended, the frequency of the servicing being dependent on the frequency and conditions of use. All force-measuring systems should be calibrated periodically so that their results are reliable and consistent with those obtained from other force-measuring systems. However, the test data obtained depend also on the testing techniques used. It is important for users of this Standard to make reference to the specified method of test and also to printed literature provided by manufacturers of testing equipment.

Calibration authorities and force-measuring system users should note that the calibration procedures specified in this Standard apply only to statically applied forces.

Special procedures, which are outside the scope of this Standard, should be followed for dynamic calibration of force-measuring systems employing high rates of force application.

STANDARDS AUSTRALIA

Australian Standard
Calibration and classification of force-measuring systems

SECTION 1 SCOPE AND GENERAL

1.1 SCOPE

This Standard specifies requirements for the static calibration of force-measuring instruments and their classification as working force standards. It also specifies the requirements for the static calibration of force-measuring systems of uniaxial testing machines and other force-measuring systems used for measuring the strength and other properties of materials, components, products and assemblies.

The Standard covers the following subjects:

(a) Classification requirements for force-measuring systems of testing machines and other force-measuring systems.

(b) Procedures for the calibration of force-measuring systems.

(c) Requirements for the calibration and the classification of working force standards used for the verification of force-measuring systems.

NOTES:

1 Requirements for extensometers used in conjunction with tension and compression testing machines are given in AS 1545.

2 Advice and recommendations on information necessary for the performance of calibration are contained in the purchasing guidelines set out in Appendix A.

This Standard applies to testing machines and force-measuring systems which indicate in terms of the SI unit of force, the newton (N), or in arbitrary units.

NOTE: Reference should be made to AS/NZS 1376 for the relationship between the newton and technical units of force.

1.2 REFERENCED DOCUMENTS

The following documents are referred to in this Standard:

AS
1545 Methods for the calibration and grading of extensometers

2103 Dial gauges and dial test indicators (metric series)

2706 Numerical values—Rounding and interpretation of limiting values

3807 Vocabulary of basic and general terms in metrology

AS ISO/IEC
17025 General requirements for the competence of testing and calibration laboratories

AS/NZS
1376 Conversion factors

