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Australian Standard 1816, Part 1–1977

METHOD FOR BRINELL HARDNESS TEST PART 1–TESTING OF METALS

[Title allocated by Defence Cataloguing Authority:
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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 Defence
Department of Productivity
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 on behalf of the Council of the Standards Association of Australia on 15 November 1976, and was published on 1 May 1977.

To keep abreast of progress in industry, Australian standards are regularly reviewed. Suggestions for improvements to published standards, addressed to the head office of the Association, are welcomed.

This standard was issued in draft form for public review as DR 75108.

AUSTRALIAN STANDARD

METHOD FOR BRINELL HARDNESS TEST

Part 1 TESTING OF METALS

AS 1816, Part 1–1977

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PREFACE

This standard was prepared by the Association's Committee on Mechanical Testing of Metals as a revision and metrication of AS B81, Part 1–1963, which it accordingly supersedes. The former standard was the endorsement with amendment of BS 240:Part 1:1962.

In this revised standard the tables of BS 240:Part 1 have been reproduced with only the headings changed. Acknowledgement is made to the British Standards Institution in this regard.

During preparation of the standard the committee considered the resolution taken by ISO/TC 17/SC 6 that, regardless of the introduction of the International System of Units (SI), hardness values should remain unchanged. This resolution has been adhered to in this standard by the introduction of a factor of 9.8 into the formula for calculating hardness and by replacing kilograms-force by newtons in defining indenting forces.

The standard includes additional requirements for the installation, calibration and maintenance of the machine. Recommendations for user checks are set out in Appendix B.

This standard may require reference to the following Australian standards:

AS 1816 Method for Brinell Hardness Test
Part 2–Calibration of the Testing Machine

AS 1817 Method for Vickers Hardness Test
Part 1–Testing of Metals

AS B161 Charts for Approximate Comparison of Hardness Scales for Steels.

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard
METHOD FOR BRINELL HARDNESS TEST

PART 1–TESTING OF METALS

1 **SCOPE.** This standard sets out methods for measuring the Brinell hardness of metals and metal products. It includes requirements for the installation of the testing machine and for its initial and periodical calibration, and recommendations for its maintenance by the user.

NOTE: This standard does not preclude the use, by agreement, of portable hardness testing machines which meet all the requirements of Clause 6 except those requirements relating specifically to non-portable machines.

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

2.1 Test sample – a portion of material or a group of items selected from a batch or consignment by a sampling procedure.

2.2 Test specimen – a portion of material or a single item taken from the test sample for the purpose of applying a particular test.

2.3 Test piece – a prepared piece for testing, made from a test specimen by some mechanical operation.

NOTE: Brinell hardness tests may be made on test pieces or test specimens, the latter often being in the form of finished products or components.

3 **PRINCIPLE OF TEST.** The test consists in pressing a hardened steel ball, of diameter D, into the surface of the test piece under a known force, and then measuring the resulting indentation (see Fig. 1).

After removal of the force, the mean diameter, d, of the indentation is determined from measurements of this diameter in two directions at right angles. The area of the curved surface of the indentation is calculated from d assuming the indentation to be a segment of a sphere of diameter D.

The Brinell hardness is the quotient obtained by dividing the force, expressed in newtons, by 9.806 65 times the surface area of the indentation, expressed in square millimetres.

Hardness values may therefore be determined from the following formulas:

$$\text{HB} = \frac{2F}{9.806\,65\,\pi D[D-\sqrt{(D^2-d^2)}]} \quad \ldots \quad (1)$$

$$= \frac{0.204F}{\pi D[D-\sqrt{(D^2-d^2)}]} \text{ approximately} \ldots \quad (2)$$