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METHODS FOR THE MEASUREMENT OF CASE DEPTH IN STEELS

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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:

Associated Chambers of Manufactures of Australia
Bureau of Steel Manufacturers of Australia
Commonwealth Aircraft Corporation
Department of Defence
Federated Chamber of Automotive Industries
Institute of Steel Service Centres of Australia
Metal Trades Industry Association of Australia
Railways of Australia Committee
Society of Automotive Engineers— Australasia
Telecom Australia
University of New South Wales (School of Metallurgy).

This standard, prepared by Committee MT/8, Metallography, was approved by the Metals Standards Board on behalf of the Council of the Standards Association of Australia on 2 September 1976, and was published on 1 June 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 75019.

AUSTRALIAN STANDARD

**METHODS FOR THE
MEASUREMENT OF
CASE DEPTH IN STEELS**

AS 1982 — 1977

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PREFACE

This standard was prepared by the Association's Committee on Metallography to provide suitable standard methods for the measurement of case depth in steel products.

The standard is one of a series relating to the use of micrographic and macrographic procedures for the measurement of case depth and decarburization in steel products, the others in the series being AS 2003, Methods for the Measurement of Decarburization in Carbon and Low Alloy Steels, and AS 2028, Methods for the Measurement of the Depth of Hardening in Flame and Induction Hardened Steel Products.

This standard describes six methods for the measurement of case depth. Each method has a specific application, but for general testing purposes the following order of tests is preferred: hardness, micrographic, macroscopic, microhardness, spectrometric, and chemical.

During preparation of the standard the committee considered SAE J423a, Methods of Measuring Case Depth, and acknowledgement is made of the assistance received therefrom.

This standard may require reference to the following standards:

- | | |
|-----------|---|
| AS 1817 | Methods for Vickers Hardness Test
Part 1 — Testing of Metals |
| AS K1 | Methods for the Sampling and Analysis of Iron and Steel
Part 2 — Determination of Carbon (Total Graphitic and Combined) in Iron, Steel and Ferro-chromium: Gravimetric |
| ASTM E384 | Methods of Test for Microhardness of Materials |
| ASTM E415 | Spectrochemical Analysis of Carbon and Low Alloy Steel using a Vacuum Spectrometer. |

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STANDARDS ASSOCIATION OF AUSTRALIA

Australian Standard METHODS FOR THE MEASUREMENT OF CASE DEPTH IN STEELS

1 SCOPE. This standard describes methods for the measurement of case depths of up to 3 mm in steel products, the case having been produced by carburizing, nitriding, carbo-nitriding, or cyaniding heat treatment processes.

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

2.1 Case — a surface layer having a different chemical composition from that of the core. Such differences arise from the diffusion of carbon and/or nitrogen from external sources into the steel.

2.2 Core — that portion of steel which is bounded, totally or in part, by the case, and which remains chemically unchanged during the case hardening process.

2.3 Effective case depth — the distance measured along a line normal to the original surface to the point where the hardness first equals a specified hardness value.

2.4 Total case depth — the distance measured along a line normal to the original surface of a hardened or unhardened case to a point where differences in chemical or physical properties of the case and core cannot be distinguished.

NOTE: 'Case depth' is normally taken to be the effective case depth.

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

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

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

3 PRINCIPLE OF METHODS. The enrichment of the surface layer of steel with carbon and/or nitrogen alters the chemical composition, the micrographic structure, and the mechanical properties of the surface layer. It is thus possible to use chemical, macroscopic, and hardness methods for the measurement of case depth.