

DETERMINATION OF EFFECTIVE CASE DEPTH OF CASE HARDENED COMPONENTS**Application**

This method is used for the determination of the effective case depth of carburized and carbo-nitrided parts, in the specified finished condition, by hardness gradient. Application is limited to low alloy carburizing steel parts, with an effective case depth above 0.25 mm where there is a difference in hardness of 100 HV between case and core.

Apparatus Required

Cut-Off Machine

Mounting Press and Mounting Media

Metallurgical Grinders or equivalent

Polishing Papers - Grades 280 - 600

Polishing Machine

Vickers Hardness Testing Machine

Metallurgical Microscope with Calibrated Graticule

Conditioning and Test Conditions

All test values indicated herein are based on material conditioned in a controlled atmosphere of 23 +/- 2 °C and 50 +/- 5 % relative humidity for not less than 24 h prior to testing and tested under the same conditions unless otherwise specified.

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2000 08 30	Revised	Editorial – no technical change A. Cockman
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Procedure

A. Sample Selection and Preparation

1. Unless otherwise specified, components shall be sectioned in such a manner as to permit measurement in the following position:
 - (a) **Helical and Spur Gear Teeth**
Case depth is to be measured normal to surface at the pitch diameter in a plane normal to, and mid way along the tooth flank face. If the pitch diameter is not clearly defined as for bevel gears, then for case depth measuring purposes, it shall be taken as that point mid way between apex and root, measured on the thrust face of the gear tooth.
 - (b) **Gear End (Thrust) Faces**
Normal to the surface at the mid-width position in a radial plane parallel to the axis of the gear (see Sketch 2).
 - (c) **Shafts, Bearing Journals and Pins**
Normal to the surface at a position one third along the length of the shaft or journal and in a plane normal to the axis of the shaft or journal (see Sketch 3).
 - (d) **Other Components**
Normal to the surface, position is dependent on the function of the component.
2. Cut a specimen approximately 10 mm thick from the component under test in the specified area, avoiding any overheating/burning or rounding of edges.
3. Mount the specimen in the media and then polish the relevant surface, using the polishing papers and machine, ensuring that the finish surface is suitable for microscopic examination.

B. Hardness Determination (See Page 5, Figure 1)

1. Preferably with the specimen in the unetched condition, determine the hardness of the case using the Vickers machine with a 5 kgf load at regular intervals from the surface of the specimen, ensuring that:
 - (a) All impressions are within a band normal to the surface and of 2 mm maximum width.
 - (b) The first impression is a minimum of 0.2 mm from the surface.
 - (c) The distance from the center of any impression to the next impression is not less than 2 1/2 times the diagonal of the impression.