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JAPANESE INDUSTRIAL STANDARD

**Method of measuring nitrided
case depth for
iron and steel**

JIS G 0562—1993

Translated and Published

by

Japanese Standards Association

Printed in Japan

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Method of measuring nitrided case depth
for iron and steel

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1. Scope This Japanese Industrial Standard specifies measuring methods for the nitrided case depth of iron and steel (hereafter referred to as the "nitrided case depth") by means of nitriding, nitrocarburizing, etc. (hereafter referred to as the "processing").

Remarks 1. The specification on processing, etc. shall be as given in JIS B 6915.

2. The standards cited in this Standard are the following:
- JIS B 0601 - Definitions and designation of surface roughness
 - JIS B 6915 - Nitriding of steel
 - JIS G 0201 - Glossary of terms used in iron and steel (Heat treatment)
 - JIS Z 2244 - Method of Vickers hardness test
 - JIS Z 2251 - Method of Knoop hardness test

2. Definitions The principal terms used in this Standard are as defined in the following, and for the rest of the terms, definitions given in JIS G 0201 apply.

- (1) compound layer depth The depth of the layer which includes mainly nitride, carbide, carbo-nitride, etc. from the surface.
- (2) diffusion layer depth The depth of the layer which is appreciated diffusion of nitrogen, carbon, or the like, but excluding the compounds layer.
- (3) nitrided case depth The distance from the surface of nitrided layer to the point where the difference between the physical or chemical behavior of the nitrided layer and that of the matrix is infeasible to identify. The nitrided case depth is the summation of the depths of compound layer and diffusion layer.
- (4) practical nitrided case depth The distance from the surface of nitrided layer to the point where it is harder by 50 in Vickers or Knoop hardness than that of matrix.
- (5) hardness transition curve A curve which describes the relationship between the vertical distance from the surface of nitrided layer and corresponding hardness.

3. Classification of measuring methods

3.1 Measuring method by hardness test The hardness of the cutting plane of the test specimen is measured, whereby the nitrided case depth is determined.

3.2 Measuring method by micro-structure test After etching the cutting plane of the test specimen, the micro-structure thereof is observed with a metallurgical microscope, whereby the nitrided case depth is determined.

4. Test specimen For the test specimen, the product itself shall be used. If this is infeasible, iron and steel of the same quality of the said product which is treated under the same conditions thereof may be used.

5. Measuring method by hardness test

5.1 Hardness test The hardness test shall be carried out as follows:

- (1) The test specimen shall be made by cutting the test material at a right angle to the processed surface and the cutting plane shall be finished by polishing suitable for the test surface. Sufficient care shall be taken in cutting and polishing so that these processes may not affect the hardness of the test surface and also may not cause "unfilled at corner", "round at corner", etc.
- (2) The hardness transition curve shall be drawn by means of Vickers hardness test specified in JIS Z 2244 or Knoop hardness test specified in JIS Z 2251 applied to the test surface, and the nitrided case depth or practical nitrided case depth shall be determined therewith.

In this case, the test load to be applied to the hardness test shall be not more than 2.942 N (see Attached Fig. 1 in Annex).

- (3) The measuring method for diffusion layer depth shall be as given in Annex.

5.2 Drawing of hardness transition curve Drawing of a hardness transition curve shall be as given in the following:

- (1) The hardness transition curve shall be drawn by measuring the hardness in turn at each point to be measured on the test surface along a straight line at a right angle to the surface of the specimen. If necessary, 2 to 5 rows shall be selected within a range of 1.5 mm on the test surface which are perpendicular to the surface of the specimen respectively, and one hardness transition curve shall be drawn by measuring hardness on each point on each row (see Fig. 1).