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NATIONAL STANDARD OF THE PEOPLE'S REPUBLIC OF CHINA

GB/T 5617-2025

Replacing GB/T 5617-2005

Determination of surface hardening depth for steel

钢件表面淬火硬化层深度的测定

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1 Scope

This Document specifies the test principles, test equipment, specimens, test methods, result evaluation, and test report for the surface hardening depth of steel and the total thickness of surface hardening depth.

This Document applies to parts subjected to surface hardening methods such as induction hardening, flame hardening, laser hardening, and electron beam hardening, etc.

2 Normative References

GB/T 4340.1

GB/T 4340.2

GB/T 7232

GB/T 18449.1

GB/T 18449.2

3 Terms and Definitions

For the purposes of this Document, the terms and definitions given in GB/T 7232 and the

following apply.

3.1 Surface hardening depth; SHD

The vertical distance from the workpiece surface to the specified boundary hardness.

NOTE. Boundary hardness = A x minimum surface hardness (HV) by the technical requirements. Typically, A = 0.8.

3.2 Total thickness of surface hardening depth; THD

The distance from the workpiece surface to the boundary with the same hardness as the substrate.

NOTE. The total thickness of surface hardening depth is measured using either hardness or metallography, with metallography being the most commonly used method.

4 Symbols and Abbreviated Terms

The symbols and abbreviated terms given in Table 1 apply to this Document.

5 Principle

5.1 The hardness gradient curve on a cross section perpendicular to the workpiece surface is used to determine the hardening depth.

5.2 The hardening depth is determined graphically from the hardness distribution curve as a function of distance from the surface.

5.3 When measuring the total thickness of surface hardening depth using the hardness method (detecting hardness changes), a tangent to the hardness distribution curve is drawn in the area where the hardness decreases significantly. The distance from the intersection of this tangent with the core hardness curve to the surface is the total thickness of surface hardening depth (see Figure 1). When measuring using the metallographic method, the distance from the surface to the boundary where no visible change occurs with the matrix structure is the total thickness of surface hardening depth. The test report shall indicate whether the hardness method or metallographic method was used.

6 Test Equipment

6.1 The Vickers hardness test shall be conducted. The hardness tester shall be inspected and calibrated in accordance with the provisions of GB/T 4340.2.

6.2 The Knoop hardness test may also be used, with the hardness tester inspected and calibrated in accordance with the provisions of GB/T 18449.2, upon agreement between the parties involved.

6.3 When measuring the total thickness of surface hardening depth after using metallographic

methods, the hardened layer shall occupy 1/3 to 2/3 of the microscope's field of view.

7 Specimen

7.1 Unless otherwise agreed, the hardened layer depth shall be measured on a cross section of a part that meets the following conditions.

a) The test cross section shall be perpendicular to the longitudinal axis of the part. If no longitudinal axis exists, the test may be conducted on a cross section perpendicular to a specific surface of the workpiece by agreement between the parties involved.

b) The specimen shall adopt a polished, non-corroded surface. The specimen shall be cut using a gentle technique and secured to ensure a good edge. When grinding and polishing, use appropriate abrasives to remove any surface damage from the cutting and grinding process to avoid affecting the hardness of the test surface and to avoid rounded edges.

The test surface shall be polished to a size sufficient to accurately measure the hardness indentation. The lower the test force, the higher the quality of specimen preparation .....