

ICS 25.200
CCS J36



**NATIONAL STANDARD OF THE
PEOPLE'S REPUBLIC OF CHINA**

GB/T 11354-2025

Replacing GB/T 11354-2005

**Determination of nitriding hardness depth and metallographic
examination for steel**

钢件渗氮层深度测定和金相组织检验

Issued on: August 29, 2025

Implemented on: March 1, 2026

**Issued by: State Administration for Market Regulation;
Standardization Administration of China**

Table of Contents

1	Scope
2	Normative References
3	Terms and Definitions
4	Symbols and Abbreviated Terms
5	Determination of Nitriding Hardness Depth...
5.1	Nitriding hardness depth
5.1.3	Specimen
5.1.5	Result evaluation
6	Metallographic Examination of the Nitrided Layer
6.1	Original structure

1 Scope

GB/T 11354-2025 is the Chinese national standard on determination of nitriding hardness depth and metallographic examination for steel, in the field of manufacturing engineering. The /T suffix marks it as a recommended standard: it is not compulsory by itself, but it becomes binding as soon as a contract, a tender or a customer specification calls it up - which in practice is how most foreign buyers meet it. It was issued on 29 August 2025 by the State Administration for Market Regulation; Standardization Administration of China, and has been in force since 1 March 2026. Classification: ICS 25.200, CCS J36. This page is published from the official record of the standard held by the Chinese standards administration: the identification, the dates, the classification and the issuing body are taken from there. The clause text, the tables and the numeric limits are in the document itself, which is delivered complete in English translation.

This Document specifies the method for determining the depth of the nitrided and nitrocarburized layers on steel parts and the examination of the metallographic structure before and after nitriding. This Document applies to the determination of the nitriding hardened depth and the compound layer thickness after gas nitriding, ion nitriding, and nitrocarburizing treatments on steel parts, as well as the examination and evaluation of nitrided layer's brittleness, porosity, nervation and wave like nitride, and the microstructure before nitriding.

2 Normative References

The provisions in following documents become the essential provisions of this Document

through reference in this Document. For the dated documents, only the versions with the dates indicated are applicable to this Document; for the undated documents, only the latest version (including all the amendments) is applicable to this Document.

GB/T 4340.1 Metallic materials - Vickers hardness test - Part

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 Nitriding hardness depth; NHD The vertical distance from the surface of the nitrided layer to the point where is 50 HV hardness limit higher than the core. NOTE. The core hardness is the arithmetic mean of 5 or more measurements at 3 times the hardened layer depth, rounded-off to the nearest multiple of 10 HV.

3.2 Compound layer thickness; CLT The thickness of the surface compound layer formed by the infiltrating elements and the metal elements in the matrix during chemical heat treatment.

3.3 Prior metallographic structure; original structure Microstructure of steel before nitriding treatment.

3.4 Brittleness of nitrided layer The degree of chipping of the corners of the Vickers hardness indentation on the surface of the nitrided part under a certain test force.

3.5 Porosity of nitrided layer The density of micropores in the compound layer on the surface of nitrided parts.

3.6 Nervation and wave like nitride The pulse-like nitrides in the diffusion layer of the nitrided part are parallel to the surface.

4 Symbols and Abbreviated Terms

Table 1 gives the symbols and abbreviated terms that are applicable to this Document.

5.1 Nitriding hardness depth

5.1.1 Principle The hardened layer depth is determined from the hardness gradient curve on a cross section perpendicular to the specimen surface. The hardened layer depth is determined graphically from the hardness distribution curve as a function of distance from the surface.

5.1.2 Test equipment The Vickers hardness is used for testing, and the hardness tester is verified and calibrated in accordance with the provisions of GB/T 4340.2. By agreement between the parties involved, the Knoop hardness may also be used for testing, and the hardness tester is verified and calibrated in accordance with the provisions of GB/T

18449.2.

5.1.3 Specimen

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

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

b) When the nitriding layer depth is unsuitable with indentation size, a step specimen (see Figure 1) or a wedge specimen (see Figure 2) may be used, after negotiation; and hardness test may be performed using a lower test force. The step specimen shall have a height of

0.05 mm or

0.10 mm from the workpiece surface to each step of the substrate and shall require precision grinding. Step specimens are used when the hardened layer depth has been roughly determined. The determination method shall be in accordance with the provisions of Appendix A.

5.1.4.1 The hardness indentation test shall be conducted on one or more parallel lines perpendicular to the surface within a width (W) of

1.5 mm, as shown in Figure

3. The distance between the parallel lines shall meet the requirements of GB/T 4340.1 or GB/T 18449.1.

5.1.4.2 The center-to-center distance between adjacent indentations (Deltad) shall be no less than 3 times the diagonal length of the indentations. The difference in distance from the center of adjacent indentations to the surface (e.g., $d_2 - d_1$) shall not exceed

0.1 mm. The accuracy of the distance measurement from the center of the indentation to the surface shall be $\pm 25 \mu\text{m}$. The measurement accuracy of each indentation diagonal shall meet the requirements of GB/T 4340.2 or GB/T 18449.2. The distance, d_1 , from the center of the first indentation to the surface shall be at least

2.5 times the diagonal length of the indentation.

5.1.4.3 When conducting hardness indentation test, the test force range for Vickers or Knoop hardness is 0.9807 N ~

2.942 N generally used.

5.1.4.4 Hardness indentation test shall be conducted under a high-quality optical microscope under good lighting conditions. The microscope shall have sufficient

magnification to ensure that the four corners of the indentation are clear and free of distortion.

5.1.5 Result evaluation

5.1.5.1 According to the test method in 5.1.4, plot the hardness distribution curve shown in Figure

4. The distance from the surface corresponding to the hardness limit (core hardness + 50 HV) on the curve is the depth of the nitriding hardness depth.