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

GB/T 231.1-2018

Replacing GB/T 231.1-2009

Metallic materials - Brinell hardness test - Part 1: Test method

金属材料 布氏硬度试验 第1部分：试验方法

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Foreword

GB/T 231 "Metallic materials - Brinell hardness test" consists of 4 parts. - Part

1 Scope

GB/T 231.1 is the Brinell hardness test method, and it is one of the most frequently cited standards in the Chinese metals system: it appears on castings, forgings, plate and bar certificates across every industry. Brinell survives alongside the newer methods because its large ball and heavy load average over a coarse or heterogeneous structure that would give scattered results with any smaller indenter, which is exactly the case for cast iron, for heavy forgings and for as-rolled steel. The standard specifies the principle, the symbols and designation of the hardness value, the requirements on the testing machine and the indenter and their verification, the preparation of the test piece and its surface and thickness requirements, the procedure including the test force, its rate of application and the dwell time, the measurement of the indentation and the calculation of the hardness, the spacing of indentations, the uncertainty and the test report. This is the clear-print edition. For a mill, a foundry or a laboratory, this is the method behind the number on the certificate.

This Part of GB/T 231 specifies the principle, symbols and descriptions, test apparatus, test piece, test procedure, uncertainty of the results and test report of the Brinell hardness test for metallic materials.

2 Normative references

The following referenced documents are indispensable for the application of this document.

For dated references, only the edition cited applies. For undated references, the latest edition of the referenced document (including any amendments) applies.

GB/T 231.2-2012 Metallic materials - Brinell hardness test - Part 2. Verification and calibration of testing machines (GB/T 231.2-2012, ISO 6506- 2:2005, MOD)

3 Principle

The Brinell hardness is proportional to the quotient obtained by dividing the test force by the surface area of the indentation. The indentation is assumed to take the shape of the unloaded ball, and its surface area is calculated from the mean indentation diameter and the indenter diameter, using the formula given in Table 1.

4 Symbols and descriptions

The following is an example of the designation of Brinell hardness, HBW. Example.

5 Test apparatus

The tungsten carbide composite indenter shall in accordance with GB/T 231.2 or JJG 150.

6 Test piece

When preparing the test piece, it shall minimize any alteration of the surface, for example, due to excessive heating or cold-working.

7 Test procedure

The test force shall be chosen so that the diameter of the indentation lies between the values $0.24D$ and $0.6D$. If the diameter of the indentation lies outside the above-mentioned limits, the ratio of indentation diameter to indenter diameter, d/D , shall be stated in the test report.

8 Uncertainty of the results

It may not always be possible to quantify the contributions of all the identified components to the uncertainty. In this case, an estimate of type A standard uncertainty can be obtained from the statistical analysis of repeated tests on the test piece.

9 Test report

Unless otherwise specified, at least the following information shall be included in the test report.