



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

GB/T 231.3-2022

**Metallic materials - Brinell hardness test - Part 3: Calibration of
reference blocks**

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Table of Contents

Foreword...	3
Introduction...	5
1 Scope...	6
2 Normative references...	6
3 Terms and definitions...	6
4 Manufacture of reference blocks...	6
5 Calibration machine...	7
6 Calibration method...	8
7 Number of indentations...	9
8 Uniformity of reference block...	9
9 Marking...	10
10 Validity...	11

Foreword

This document was drafted in accordance with the rules provided in GB/T 1.1-2020

Directives for Standardization - Part 1: Rules for the Structure and Drafting of
Standardizing Documents.

This document is Part 3 of GB/T 231 Metallic materials - Brinell hardness test. The
following parts have been released for GB/T 231:

- Part 1: Test method;
- Part 2: Verification and calibration of testing machines;
- Part 3: Calibration of reference blocks;
- Part 4: Tables of hardness values.

This document replaces GB/T231.3-2012 Metallic materials - Brinell hardness test -
Part 3: Calibration of reference blocks; compared with GB/T 231.3-2012, the major
technical changes are as follows:

- Change the test requirements for test force (see 5.4; 4.4 of the 2012 edition);
- Change the measurement requirements of the indenters (see 5.5; 4.5 of the 2012

edition);

-- Change the performance requirements of the indentation diameter measurement machine, and give the definition (see 5.6; 4.6 of the 2012 edition);

-- Delete the characteristic requirements of cemented carbide balls (see 4.8 of the

2012 edition);

-- Change the requirements for the maximum indenter approach velocity (see Clause 6, Table 3; Clause 5 of the 2012 edition);

-- Add the requirements for the reference indentation (see Clause 7);

-- Add the requirements for uncertainty content in the certificate [see 9.3d)];

-- Add a general for the evaluation of the uncertainty of measurement of the mean hardness value of reference blocks (see A.1).

This document adopts the modification of ISO 6506-3:2014 Metallic materials - Brinell hardness test - Part 3: Calibration of reference blocks.

There are technical differences between this document and ISO 6506-3:2014, and the clauses involved in these differences have been marked by a vertical single line (|) in the outer margin of the document.

The specific technical differences and their reasons are as follows:

-- Add the scope of application of this document (see Clause 1);

-- Use GB/T 231.1 which adopts the modification of international standard to replace ISO 6506-1 (see Clause 1, 5.7, Clause 6);

-- Use GB/T 231.2-xxxx which adopts the modification of international standard to replace ISO 6506-2 (see Clause 1, 5.1 and 5.5);

-- Move the "Note" of 3.1 in ISO 6506-3:2014 to content of the clause (see 4.1);

-- Use JJG 144 to replace ISO 376, to adapt to the technical conditions in China (see 5.4).

1 Scope

This document specifies a method for the calibration of reference blocks to be used in the indirect verification of Brinell hardness testing machines as described in GB/T

231.2 and for the calibration of reference blocks to be used in the regular verification

as described in GB/T 231.1. The procedures necessary to ensure metrological traceability of the calibration machine are also specified.

This Standard applies to the calibration of reference Brinell hardness blocks (hereinafter referred to as "reference blocks").

2 Normative references

The following documents are referred to in the text in such a way that some or all of their content constitutes requirements of this document. For dated references, only the version corresponding to that date is applicable to this document; for undated references, the latest version (including all amendments) is applicable to this document.

GB/T 231.1, Metallic materials - Brinell hardness test - Part 1: Test method (GB/T 231.1-2018, ISO 6506-1:2014, MOD)

GB/T 231.2-2022, Metallic materials - Brinell hardness test - Part 2: Verification and calibration of testing machines (ISO 6506-2:2017, MOD)

JJG 144, Verification regulation of standard dynamometers

3 Terms and definitions

No terms and definitions need to be defined in this document.

4.1 The block shall be specially manufactured for use as a reference block. Attention is

drawn to the need to use a manufacturing process which will give the necessary homogeneity, stability of structure, and uniformity of surface hardness.

4.2 Each metal block to be calibrated shall be of a thickness not less than

Annex A

(Informative)

Uncertainty of measurement of the mean hardness value of reference blocks

A.1 General

Measurement uncertainty analysis is a useful tool to help determine sources of error and to understand differences between measured values. This Annex gives guidance on uncertainty estimation but the values derived are for information only, unless specifically instructed otherwise by the customer.

The criteria specified in this document for the calibration requirements of the reference block have been developed and refined over a significant period of time. When determining a specific tolerance that the reference block needs to meet, the uncertainty associated with the use of measuring equipment has been incorporated within this tolerance and it would therefore be inappropriate to make any further allowance for this uncertainty by, for example, reducing the tolerance by the measurement uncertainty. This applies to all measurements associated with the manufacture and calibration of the reference blocks and also to all measurements made when performing a verification of the calibration machine. In each case, it is simply the measured value resulting from the use of the specified measuring equipment that is used to assess compliance with this document.

The metrological chain necessary to define and disseminate hardness scales is shown in GB/T 231.1-2018, Figure C.1.

A.2 Direct verification of the calibration machine

A.2.1 Measurement of the test forces

See GB/T 231.2-2022, Annex A.

A.2.2 Calibration of the indentation diameter measuring system

See GB/T 231.2-2022, Annex A.

A.2.3 Measurement of the indenter

See GB/T 231.2-2022, Annex A.

A.2.4 Measurement of the test cycle

See GB/T 231.2-2022, Annex A.

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