

ICS 83.080

CCS G 31



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

GB/T 2411-2008

**Plastics and ebonite -- Determination of indentation hardness
by means of a durometer (shore hardness)**

(English Translation)

Issued on: August 4, 2008

Implemented on: April 1, 2009

**Issued by: General Administration of Quality Supervision, Inspection and
Quarantine of the People's Republic of China**

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1 Scope

1.1

This Standard specifies a method for the determination of the indentation hardness of plastics and ebonite by means of durometers of two types: type A is used for softer materials and type D for harder materials (see the Note to 8.2). The method permits measurement either of the initial indentation or of the indentation after a specified period of time, or both.

NOTE: The durometers and the methods specified in this Standard are referred to as type A Shore and type D Shore durometers and durometer methods, respectively.

1.2

This method is an empirical method intended primarily for control purposes. No simple relationship exists between indentation hardness determined by this method and any fundamental property of the material tested. For specification purposes, it is recommended that GB/T 6031-1998 Rubber, vulcanized or thermoplastic - Determination of hardness (hardness between 10IRHD and 100 IRHD), be used for the softer materials.

2 Normative references

The articles contained in the following documents have become part of this Standard when they are quoted herein. For the dated documents so quoted, all the modifications (excluding corrections) or revisions made thereafter shall not be applicable to this

Standard. For the undated documents so quoted, the latest editions shall be applicable to

this Standard.

GB/T 2918-1998 Plastics - Standard atmospheres for conditioning and testing (idt
ISO 291:1997)

3 Principle

A specified indenter is forced into the test material under specified conditions and the depth of penetration measured.

The indentation hardness is inversely related to the penetration and is dependent on the modulus of elasticity and the viscoelastic properties of the material. The shape of the indenter, the force applied to it and the duration of its application influence the results obtained so that there may be no simple relationship between the results obtained with one type of durometer and those obtained with either another type of durometer or

7 Conditioning and testing atmospheres

7.1

For materials whose hardness is not dependent on the relative humidity, the durometer and test specimens shall be conditioned at the temperature of test (see 7.2) for at least 1 h before testing. For materials whose hardness is dependent on the relative humidity, the test specimens shall be conditioned in accordance with GB/T 2918-1998, or in accordance with the relevant material specification.

When a durometer is moved from a location below room temperature to a location with a higher temperature, it shall be placed in a suitable desiccator or airtight container immediately upon removal and allowed to remain there until the temperature of the durometer is above the dew point of the air in the new environment.

7.2

Tests shall be carried out in one of the standard atmospheres specified in GB/T 2918-1998, unless otherwise stated in the relevant material specification.

8 Procedure

8.1

Place the test specimen on a hard, horizontal, plane surface. Hold the durometer in a vertical position with the point of the indenter (4.2) at least 9 mm from any edge of the test specimen. Apply the presser foot (4.1) to the test specimen as rapidly as possible, without shock, keeping the foot parallel to the surface of the test specimen. Apply just sufficient pressure to obtain firm contact between presser foot and test specimen.

NOTE: Better reproducibility may be obtained by using either a durometer stand or a weight centred on the axis of the indenter, or both, to apply the presser foot to the test specimen. Recommended masses are 1 kg for the type A durometer and 5 kg for the type D durometer.

Read the scale of the indicating device (4.3) after $15\text{ s} \pm 1\text{ s}$. If an instantaneous reading is specified, read the scale within 1 s after the presser foot is in firm contact with the test specimen, unless the durometer has a maximum indicator, in which case the maximum reading shall be taken.

8.2

Make five measurements of hardness at different positions on the test specimen at least 6 mm apart and determine the mean value.

NOTE: It is recommended that measurements be made with the type D durometer when values above 90 are obtained with the type A durometer and that measurements be made with the type A durometer when values less than 20 are obtained with the type D durometer.

9 Test report

The test report shall include the following particulars:

- a) a reference to this Standard;
- b) all details necessary for complete identification of the material tested;
- c) a description of the test specimen, including its thickness and, in the case of a composite test specimen, the number of layers;
- d) the temperature of test, and the relative humidity when the hardness of the material is dependent on the humidity;
- e) the type of durometer used (A or D);
- f) if known and if required, the time which elapsed between preparation of the test specimen and measurement of hardness;
- g) the individual values of the indentation hardness and the time-interval after which each reading was taken;

NOTE: Readings may be reported in the form Shore hardness A/15:45, where A is the type of durometer, 15 is the time, in seconds, between bringing the pressure foot in firm contact with the test specimen and taking the reading, and 45 is the reading. Similarly, Shore hardness D/1:60 indicates a reading of 60 on the type D durometer obtained either within 1 s or from a maximum indication.

- h) the average value of the indentation hardness;
- i) details of any operations not specified in this Standard, as well as details of any incidents likely to have influenced the results.

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