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

GB/T 39693.1-2025

Replacing GB/T 23651-2009

**Rubber, vulcanized or thermoplastic - Determination of
hardness - Part 1: Introduction and guidance**

硫化橡胶或热塑性橡胶 硬度的测定 第1部分：介绍与指南

(English Translation)

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Foreword

This document complies with the provisions of GB/T 1.1-2020 "Standardization Work Guidelines Part 1: Structure and Drafting Rules of Standardization Documents".

Drafting.

This document is Part 1 of GB/T 39693, "Determination of Hardness of Vulcanized or Thermoplastic Rubber". GB/T 39693 has been issued.

The following parts were laid out.

- Part 1: Introduction and Guide;
 - Part 2: International Hardness of Rubber (10IRHD~100IRHD);
 - Part 3: Determination of Hardness at a Fixed Test Force using the Ultra-Low Rubber Hardness (VLRH) Scale;
 - Part 4: Determination of indentation hardness using the Shore hardness tester method;
 - Part 5: Determination of indentation hardness using a portable rubber hardness tester;
 - Part 6: IRHD method for determining the apparent hardness of rubber rollers;
 - Part 7: Shore Hardness Test for Apparent Hardness of Rubber Rollers;
 - Part 8: Zhao's Hardness (P)
 - Part 9: Calibration and Verification of Hardness Testers this document replaces GB/T 23651-2009 "Introduction and Guide to Hardness Testing of Vulcanized Rubber or Thermoplastic Rubber", except for structural adjustments and Aside from editorial changes, the main technical changes are as follows.
- a) Added relevant content on the Very Low Rubber Hardness (VLRH) scale (see Chapter 5 and Chapter 8);

b) The wording of "constant load" has been changed (see Chapters 4, 5, 8, and 11; Chapters 4 and 5 of the 2009 edition).

Chapters 8 and 11).

This document is equivalent to ISO 48-1:2018 "Determination of hardness of vulcanized or thermoplastic rubber - Part 1: Introduction and guidance".

The following minimal editorial changes have been made to this document.

---A warning message has been added.

Please note that some content in this document may involve patents. The issuing organization of this document assumes no responsibility for identifying patents.

This document was proposed by the China Petroleum and Chemical Industry Federation.

This document is under the jurisdiction of the National Technical Committee on Standardization of Rubber and Rubber Products (SAC/TC35).

Introduction

GB/T 39693, "Determination of Hardness of Vulcanized Rubber or Thermoplastic Rubber," aims to establish a standard for determining the hardness of vulcanized rubber or thermoplastic rubber.

The experimental method is proposed to consist of nine parts.

---Part 1: Introduction and Guidelines. This section aims to introduce various aspects of hardness testing for vulcanized or thermoplastic rubbers and to define hardness...

The terminology and definitions used in the testing provide guidance for the appropriate selection of hardness testing methods.

---Part 2: International Hardness of Rubber (10 IRHD~100 IRHD). The purpose is to specify the international hardness of vulcanized rubber or thermoplastic rubber.

Methods for determining rubber hardness (IRHD).

---Part 3: Determination of test force hardness using the Very Low Rubber Hardness (VLRH) scale. The purpose is to specify the hardness of vulcanized rubber or thermoplastic rubber.

A method for determining the hardness of rubber under constant test force using an ultra-low rubber hardness (VLRH) scale.

---Part 4: Determination of indentation hardness using the Shore hardness tester (Shore hardness). The purpose is to specify the indentation hardness of vulcanized rubber or thermoplastic rubber.

The method for determining indentation hardness using the Shore hardness tester (Shore hardness).

---Part 5: Determination of indentation hardness using a portable international hardness tester for rubber. The purpose is to specify the indentation hardness of vulcanized or thermoplastic rubbers.

A method for determining indentation hardness using a portable international rubber hardness tester.

---Part 6: IRHD Method for Determining the Apparent Hardness of Rubber Rollers. The purpose is to specify the IRHD method for vulcanized or thermoplastic rubber.

Method for determining the apparent hardness of rubber rollers.

---Part 7: Shore Hardness Test for Apparent Hardness of Rubber Rollers. The purpose is to specify the Shore hardness of vulcanized rubber or thermoplastic rubber for use.

A method for determining the apparent hardness of rubber rollers using a hardness meter.

---Part 8: Zhao's Hardness (P) Zhao (P)

---Part 9: Calibration and Verification of Hardness Testers. The purpose is to establish calibration and verification procedures for various rubber hardness testers.

Determination of hardness of vulcanized rubber or thermoplastic rubber Part 1: Introduction and Guide Warning 1. Personnel using this document should have practical experience working in a formal laboratory. This document does not cover all possible safety hazards.

Users are responsible for taking appropriate safety and health measures and ensuring compliance with relevant national regulations.

Warning 2---Some steps outlined in this document may involve the use or generation of certain wastes, which may pose a hazard to the local environment.

The relevant documents should specify appropriate safe operating procedures and post-use disposal provisions.

1 Scope

This document provides guidelines for testing the hardness of vulcanized or thermoplastic rubber.

Hardness is one of the material performance indicators. This document aims to recognize its importance and help in selecting appropriate hardness testing methods.

2 Normative references

This document has no normative references.

3 Terms and Definitions

The following terms and definitions apply to this document.

International Hardness of Rubber IRHD Choose an appropriate hardness scale so that a hardness value of 0 represents a Young's modulus of 0, and a hardness value of 100 represents a Young's modulus of none.

Poor and big.

Note: Within the normal hardness range, the following conditions must be met.

- a) The increment in the international hardness of rubber always approximately represents the increment in Young's modulus in the same proportion;
- b) High-elasticity rubber, the international hardness of conventional rubber is comparable to that of Shore A hardness.

Standard Hardness

The international standard for rubber is determined according to the procedure specified in ISO 48-2 using a specimen with standard thickness and not less than the specified minimum transverse dimension.

hardness.

Apparent hardness

The international hardness of rubber was measured using non-standard sized specimens according to the procedure specified in ISO 48-2.

4 Indentation Hardness

The hardness of rubber is a stiffness measurement value obtained through an indentation test. An indenter is pressed into the rubber under a given test force, as shown in Figure 1.

The diagram shows the indentation depth measured. Unlike hardness testing methods for other materials, rubber indentation depth testing is performed under applied test force.