



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

GB/T 39693.3-2021

**Rubber, vulcanized or thermoplastic - Determination of
hardness - Part 3: Dead-load hardness using the very low
rubber hardness(VLRH) scale**

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Foreword

GB/T 39693 "Determination of the hardness of vulcanized rubber or thermoplastic rubber" is planned to be divided into the following 9 parts.

---Part 1.Introduction and Guide;

---Part 2.International Rubber Hardness (10IRHD~100IRHD);

---Part 3.Use the ultra-low rubber hardness (VLRH) scale to determine the hardness of the test force;

---Part 4.Determine the indentation hardness by the Shore hardness tester method (Shore hardness);

---Part 5.Use the portable international rubber hardness tester to determine the indentation hardness;

---Part 6. Use the IRHD method to determine the apparent hardness of the rubber roller;

---Part 7. Use the Shore hardness tester to determine the apparent hardness of the rubber roller;

---Part 8. Using Zhao's (P

---Part 9. Calibration and verification of the hardness tester.

This part is Part 3 of GB/T 39693.

This section was drafted in accordance with the rules given in GB/T 1.1-2009.

The translation method used in this part is equivalent to the adoption of ISO 48-3:2018 "Determination of the hardness of vulcanized rubber or thermoplastic rubber Part 3. Use Ultra-low rubber hardness (VLRH) scale to determine the hardness of the test force".

The Chinese documents that have a consistent correspondence with the international documents cited in this section are as follows.

---GB/T 2941-2006 Rubber Physical Test Method General Procedure for Sample Preparation and Adjustment (ISO 23529:2004, IDT)

---GB/T 25269-2010 Rubber Test Equipment Calibration Guidelines (ISO 18899:2004, IDT)

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

This part is under the jurisdiction of the General Test Methods Subcommittee of the National Rubber and Rubber Products Standardization Technical Committee (SAC/TC35).

Drafting organizations of this section. Guangdong Institute of Metrology, German Business Borui Instrument (Shanghai) Co., Ltd., Industrial Chain (Ningbo) Information Technology Co., Ltd., Xinlun Technology (Changzhou) Co., Ltd., Guangdong Crown Adhesive Products Co., Ltd., Sailun Group Co., Ltd., Beijing Rubber Industry

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Introduction

The hardness test method specified in this document is for rubber with a hardness below 35IRHD in the International Rubber Hardness Scale (ISO 48-2).

A more recognizable alternative. The AO scale method of soft rubber shore hardness tester is given in ISO 48-4. Typical application packages of these methods

Including low modulus support, soft roll outer rubber and printing rubber.

Figure 1 shows the comparison of the hardness ranges of IRHDN and IRHDL in the ISO 48-2 standard with the VLRH hardness ranges in this part.

The main difference between these methods is the diameter of the spherical indenter and the size of the press-in force. The appropriate method can be selected according to the specific application.

Determination of the hardness of vulcanized rubber or thermoplastic rubber

Part 3. Use Ultra Low Rubber Hardness (VLRH) Scale

Determine the hardness of the test force

1 Scope

This part of GB/T 39693 specifies a method for measuring ultra-soft vulcanized rubber or thermoplastic rubber using an ultra-low rubber hardness (VLRH) scale.

The method of gel setting test force hardness.

The indentation depth of the spherical indenter has a linear relationship with the VLRH scale.

2 Normative references

The following documents are indispensable for the application of this document. For dated reference documents, only the dated version applies to this article

Pieces. For undated reference documents, the latest version (including all amendments) is applicable to this document.

ISO 48-9.2018 Determination of hardness of vulcanized rubber or thermoplastic rubber
Part 9. Calibration and verification of durometer (Rubber,

vulcanized or thermoplastic-Determination of hardness-Part
9. Calibration and verification of hard-
ness testers)

ISO 18899 Rubber-Guide to the calibration of test equipment
(Rubber-Guide to the calibration of test equipment)

ISO 23529 Rubber-General procedures for the preparation and adjustment of rubber
physical test methods (Rubber-General procedures for pre-
paring and conditioning test pieces for physical test methods)

3 Terms and definitions

Terms and definitions are not listed in this document.

ISO and IEC have established terminology databases for standardization purposes. The

website is as follows.

4 Test principle

This hardness test includes the measurement of the indentation depth difference of the spherical indenter pressed into the rubber surface under the action of a small contact force and a large total force.

value. According to this difference, the "Very Low Rubber Hardness" (VLRH) value can be obtained from Table A.1 (see Appendix A) or a curve drawn based on this table.

Or it can be directly read by a ruler calculated from the table and installed on the indentation depth measuring device.

5 Instruments

The main components of the instrument are as follows, and suitable dimensions and force values are shown in Table 1. See references [3] and [4] for details.

5.1 Vertical guide bar

Vertically movable pressure rod, the lower end is a rigid ball or spherical surface, the support device of the pressure rod can make it just before applying contact force

The lower end of the sex ball is slightly higher than the reference surface of the annular foot.

5.2 Device for applying contact force and press-in force to the press rod

The acting force includes the weight of the pressure rod and the accessories connected to it, as well as all spring forces that may act on the pressure rod, so that it is actually applied to the pressure rod.

The force at the end of the rod meets the regulations.

5.3 A device for measuring the increase in the indentation depth of the plunger produced by the indentation force

The maximum uncertainty in millimeters is 0.001mm, or when reading the VLRH value directly, a score of at least 0.5VLRH can be obtained

Discernment.

5.4 Annular flat foot pressing

It is perpendicular to the axis of the pressing rod and has a concentric circular hole through which the pressing rod passes. A device for pressing the foot on the sample, pressing the