

International Organization for Standardization ISO 48:1994

ISO 48:1994 Rubber Hardness Determination Standard

Instruction Manual for the Determination of Hardness (between 10 IRHD and 100 IRHD)

1. INTRODUCTION

This document, ISO 48:1994, specifies methods for determining the hardness of vulcanized or thermoplastic rubbers. It outlines four primary methods for flat surfaces: Normal test (N), High-hardness test (H), Low-hardness test (L), and Microtest (M). Additionally, it describes four corresponding methods for determining the apparent hardness of curved surfaces: CN, CH, CL, and CM. The fundamental difference between these methods lies in the diameter of the indenting ball and the magnitude of the indenting force applied during the test.

This standard is crucial for ensuring consistent and comparable hardness measurements across various rubber materials and applications. Adherence to these procedures is essential for accurate material characterization and quality control.



Figure 1: Cover page of the ISO 48:1994 International Standard document. This image displays the title, 'Rubber, vulcanized or thermoplastic - Determination of hardness (hardness between 10 IRHD and 100 IRHD)', along with the ISO logo and standard number.

2. SETUP AND PREPARATION

Proper setup and preparation are critical for obtaining accurate hardness measurements. This section outlines the general requirements for test pieces, apparatus, and environmental conditions.

2.1 Test Piece Requirements

- **Flat Surfaces:** For methods N, H, L, and M, test pieces must have at least one flat surface. The thickness should be sufficient to prevent the indenting ball from touching the supporting surface.
- **Curved Surfaces:** For methods CN, CH, CL, and CM, test pieces must have a curved surface suitable for the specific test.
- **Conditioning:** Test pieces should be conditioned at the standard laboratory temperature (23 ± 2 °C) for at least 3 hours before testing, unless otherwise specified by the material standard.

2.2 Apparatus

The hardness testing apparatus must conform to the specifications outlined in the standard, ensuring precise application of force and measurement of indentation. Key components include:

- **Indenter:** A spherical indenter (ball) of specified diameter for each method (e.g., 2.5 mm for Normal test).
- **Loading Device:** A mechanism to apply the minor and major loads smoothly and without shock.
- **Measuring Device:** An instrument to measure the depth of indentation with high accuracy.
- **Test Stand:** A rigid stand to hold the test piece and apparatus securely.

3. OPERATING PROCEDURES

This section details the step-by-step procedures for performing hardness tests on rubber materials according to ISO 48:1994.

3.1 General Procedure for Flat Surfaces (Methods N, H, L, M)

1. Place the conditioned test piece on the rigid test stand, ensuring it is flat and stable.
2. Position the indenter over the desired test area, ensuring it is at least 6 mm from any edge or previous indentation.
3. Apply the minor load (initial contact force) to the indenter. Allow it to rest for a specified pre-load time (e.g., 5 seconds).
4. Zero the measuring device or record the initial indentation depth.
5. Apply the major load (additional force) smoothly and without shock.
6. After a specified dwell time (e.g., 30 seconds), record the final indentation depth.
7. Calculate the hardness value based on the difference between the initial and final indentation depths, using the appropriate conversion table or formula provided in the standard.
8. Perform at least three measurements on different parts of the test piece and calculate the median value.

3.2 Procedure for Curved Surfaces (Methods CN, CH, CL, CM)

For curved surfaces, the procedure is similar to that for flat surfaces, but specific considerations apply to ensure proper contact and measurement. The standard provides detailed guidance on adapting the apparatus and calculation for curved geometries to determine apparent hardness.

4. MAINTENANCE OF TESTING EQUIPMENT

Regular maintenance of hardness testing equipment is essential to ensure its accuracy and longevity. Follow these guidelines:

- **Cleaning:** Keep the indenter and test stand clean and free from dust, debris, or rubber residues. Use a soft, lint-free cloth.
- **Calibration:** Periodically calibrate the hardness tester using certified reference blocks. The frequency of calibration should be based on usage and manufacturer recommendations, typically annually.
- **Inspection:** Regularly inspect the indenter for wear, damage, or deformation. A worn indenter can lead to inaccurate readings.
- **Lubrication:** If applicable, lubricate moving parts according to the manufacturer's instructions to ensure smooth operation of the loading mechanism.
- **Storage:** Store the equipment in a clean, dry environment, protected from extreme temperatures and humidity.

5. TROUBLESHOOTING COMMON ISSUES

Encountering issues during hardness testing can affect the reliability of results. Here are some common problems and their potential solutions:

Problem	Possible Cause	Solution
Inconsistent Readings	Improper test piece conditioning; worn indenter; unstable test setup; incorrect dwell time.	Ensure proper conditioning; inspect/replace indenter; stabilize test stand; adhere to specified dwell times.
Indenter slips on surface	Test piece not securely placed; surface contamination.	Secure test piece; clean test piece surface.
Readings outside expected range	Incorrect test method selected; apparatus out of calibration; material variation.	Verify correct method for material; calibrate apparatus; check material batch consistency.

6. SPECIFICATIONS

The ISO 48:1994 standard provides detailed specifications for the apparatus and procedures. Key parameters include:

- **Hardness Range:** Applicable for hardness values between 10 IRHD and 100 IRHD.
- **Indenter Diameters:** Varies by method (e.g., Normal test uses a 2.5 mm diameter ball).
- **Minor Load:** Specified initial contact force.
- **Major Load:** Specified additional force applied for measurement.
- **Dwell Time:** The duration for which the major load is applied before reading (typically 30 seconds).
- **Test Temperature:** Standard laboratory temperature of 23 ± 2 °C.

For complete specifications, refer to the official ISO 48:1994 document.

7. WARRANTY AND SUPPORT

As an international standard document, ISO 48:1994 does not come with a product warranty in the traditional sense. It is a technical publication providing guidelines and specifications.

For support regarding the interpretation or application of this standard, please refer to the official channels of the International Organization for Standardization (ISO) or your national standards body (e.g., ANSI in the USA). These

organizations provide clarifications, updates, and related publications.

- **Official ISO Website:** www.iso.org
- **Publisher/Distributor:** Multiple. Distributed through American National Standards Institute (ANSI).
- **Publication Date:** August 23, 2007 (for this edition).

© 1994-2025 International Organization for Standardization. All rights reserved.
This manual is for informational purposes only and is based on the ISO 48:1994 standard.

ASK A QUESTION ABOUT THIS MANUAL

Ask about setup, troubleshooting, compatibility, parts, safety, or missing instructions. Manuals+ will review the question and use this page's manual context to help answer it.

Name

Anonymous

Email

you@example.com

After a successful submission, we securely hash the supplied account or form email before sending it to Microsoft Advertising for conversion attribution. [Privacy details](#).

Question

Example: How do I reset this device or fix this error?

Details

Model number, symptoms, what you tried, or the section of the manual you are using.

Submit question