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

GB/T 1681-2009

Replacing GB/T 1681-1991

**Rubber -- Determination of rebound resilience of vulcanizates
(English Translation)**

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Foreword

This standard is equivalent to ISO 4662:1986 "Determining the Resilience of Vulcanized Rubber" (English version).

This standard replaces GB/T 1681-1991 "Determination of vulcanized rubber resilience".

This standard is equivalent to translation ISO 4662:1986.

For ease of use, this standard makes the following editorial changes.

- a) replace "this International Standard" with "this standard";
- b) replace the "," as a decimal point with a decimal point ".";

c) The preamble to international standards has been removed.

The main changes in this standard compared with GB/T 1681-1991 are as follows.

--- Added introduction;

--- Added security warning terms;

--- Added "terms and definitions" section (Chapter 3 of this edition);

--- A more detailed description and regulation of the test instrument and calibration (Chapter 4 of this edition);

--- Added informative Appendix A and Appendix B.

Appendix A and Appendix B of this standard are informative annexes.

This standard was proposed by the China Petroleum and Chemical Industry Association.

This standard is under the jurisdiction of the National Rubber Standards Committee for Rubber Physics and Chemical Testing Methods Standardization Sub-Committee (SAC/TC35/SC2).

This standard is mainly drafted by. Tianjin Rubber Industry Research Institute.

Participated in the drafting of this standard. Guizhou Tire Co., Ltd.

Introduction

When the rubber is deformed, it is accompanied by the input of energy. When the rubber returns to its original shape, a portion of this energy is released, leaving the part is converted into thermal energy from the mechanical energy inside the rubber.

When the deformation is a depression due to a single impact, the ratio of the output energy to the input energy is defined as the resilience.

For the same substance, the value of the resilience is not a fixed amount, it is the temperature distribution, the strain distribution (by the type and size of the punch and the sample) the inch rate), the strain rate (determined by the rate of the punch), the strain energy (determined by the rate and quality of the punch) and the change in the strain process.

The strain process is particularly important where the polymer is present in the filler. The stress softening effect in the polymer should also be mechanically adjusted.

The change in resilience with conditions is a property of the polymer. If the test is carried out under a wide range of conditions, only the polymer can be estimated.

Resilience. The effects of these factors described above on resilience are different and occur near the temperature region where the material changes.

Testing is the main factor affecting resilience. Factors related to time and sag amplitude also have a certain influence, and will produce large deviations.

In order to obtain the ideal resilience data, the specimen should be bonded to the rigid support to avoid the slippage caused during the impact.

Friction loss. Since in many cases it is not practical to take a method of bonding the specimen, it is necessary to firmly hold the specimen to avoid frictional slippage.

In actual equipment operation, in order to approach these ideal conditions, some restrictions on the hardness of the sample (see GB/T 6031) are ten.

Subsequent. Test the sample with high hardness to ensure the rigidity of the instrument meets the requirements, and test the sample with low hardness to ensure the clamping of the sample.

If the selected mechanical conditions and the appropriate instrument are selected, standard resilience data with satisfactory reproducibility can be obtained at any temperature.

Determination of vulcanized rubber resilience Warning. Personnel using this standard should have practical experience in formal laboratory work. This standard does not address all possible security issues.

It is the responsibility of the user to take appropriate safety and health measures and to ensure compliance with the conditions set by the relevant national regulations.

1 Scope

This standard specifies the method for determining the rubber resilience by impact in a small range of impact strain and strain rate.

This standard applies to vulcanized rubber with a hardness between 30 IRHD and 85 IRHD at the test temperature.

2 Normative references

The terms in the following documents become the terms of this standard by reference to this standard. All dated references, followed by all Modifications (not including errata content) or revisions do not apply to this standard, however, parties to agreements based on this standard are encouraged to study if it is possible to use the latest version of these files? For undated references, the latest edition applies to this standard.

GB/T 2941 Rubber physical test method General procedure for preparation and adjustment of specimens (GB/T 2941-2006, ISO 23529:2004, IDT) GB/T 6031 Determination of hardness of vulcanized rubber or thermoplastic rubber (10 to 100 IRHD) (GB/T 6031-1998, idt ISO 48:1994) Rubber and rubber products -- Determination of dynamic properties -- Part 1 . General rules (GB/T 9870.1-2006, ISO 4664-1:2005, IDT)

3 Terms and definitions

The following terms and definitions established in GB/T 9870.1 apply to this standard.

The ratio of the energy output to the energy input when impacting a flat, freely convex sample with a spherical object.

The quality of the impacted object, the characteristics of the punch and the sample to be impacted shall be within the following specified ranges.

Note 2: The above basic characteristics (12.5mm, 12.5mm, 0.35kg, 1.4m/s, 351kJ/m³) are the same as the Luke pendulum, and the tolerances can be included in the correction.

Cobb pendulum (15.0mm; 12.5mm; 0.25kg; 2m/s; 427kJ/m³) tolerance range.

In addition, the following tolerances are allowed.

--- Considering the steel balls and machining tolerances with nominal diameters of 12.5mm and 15mm, a small tolerance ($\pm 0.05\text{mm}$) is used.

4.1 Overview

The test instrument consists of a pendulum-like, single-degree-of-freedom mechanical oscillating device and a sample holder.

The two parts are assembled together in an appropriate manner to measure the resilience, and each part can be adjusted or adjusted for the swinging device.

Remove it. It shall also be configured to measure the height of the pendulum rebound, either as a calibrated scale or as an electrical signal.

Practical instruments of all designs that meet the above requirements can be used (see Appendix B).

Note: All instruments should be designed to operate within the limits specified by various parameters and accurately calibrated to give substantially the same resilience value.

4.2 Swing device

The oscillating device is composed of a pendulum rod and a hemispherical pendulum. The pendulum can move along an arc track under the action of gravity, or it can be spring or twisted.

The linear motion of the rotating wire under the action of the restoring force. At the impact point, the spherical punch speed is horizontal, that is, the contact direction of the punch with the sample.

Should be perpendicular to the specimen.