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

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Rubber, vulcanized - Measurement of fatigue crack growth rate

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foreword

This document is in accordance with the provisions of GB/T 1.1-2020 "Guidelines for Standardization Work Part 1. Structure and Drafting Rules for Standardization Documents" drafting.

This document is modified to adopt ISO 27727.2008 "Determination of Vulcanized Rubber Fatigue Crack Growth Rate".

The technical differences between this document and ISO 27727.2008 and their reasons are as follows.

--- Increase the scope of application of this document (see Chapter 1) to meet the standardization requirements of our country;

--- Replaced ISO 23529 (see 5.3, 5.4, 6.3, 6.4 and 7.1) with my country's standardization document GB/T 2941 to adapt to my country's standard standardization requirements;

--- Added a sample type (see Type B in 6.1) to match the various clamping methods of the current test equipment.

The following editorial changes have been made to this document.

--- Added note "If necessary, mark the rolling direction on the sample." (see 6.5).

Please note that some contents of this document may refer to patents. The issuing agency of this document assumes no responsibility for identifying patents.

1 Scope

This document describes a method for determining the crack growth rate of vulcanized rubber under long-term cyclic fatigue. Crack from the tip of the pre-notched specimen end and gradually expand until the final crack is large enough for complete failure. Using

pure shear specimens, by monitoring cracks during cyclic loading

To obtain the crack growth rate, that is, the increase in crack length per cycle. Adjust the loading by changing the strain amplitude of the sample

The strain energy density loaded on the sample can achieve the purpose of measuring the crack growth rate under different tear energy conditions.

This document applies to the determination of fatigue crack growth rate of vulcanized rubber.

2 Normative references

The contents of the following documents constitute the essential provisions of this document through normative references in the text. Among them, dated references

For documents, only the version corresponding to the date is applicable to this document; for undated reference documents, the latest version (including all amendments) is applicable to

this document.

GB/T 2941 General procedure for specimen preparation and adjustment of rubber physical test methods (GB/T 2941-2006, ISO 23529.2004,

IDT)

3 Terms and Definitions

The following terms and definitions apply to this document.

3.1

strain energy density

When the sample is in a strained state, it originates from the work done when the sample deforms, and is the elastic energy stored in the unit volume of the sample.

Note. The unit is Joule per cubic meter (J/m³).

3.2

tearing energy

The energy required for a crack/crack to propagate in a specimen.

Note. The tearing energy is expressed as the ratio of the total work done to the surface area of the crack, and the unit is joules per square meter (J/m²).

3.3

strain range parameter strain-range parameter

PR

(The sample is always in a strained state during the test) The minimum distance between the sample and the relaxed (zero strain) position in each cycle is the same as

Ratio of the maximum distance from the slack position.

Note. The strain range parameter $PR = d_{min}/d_{max}$, where d_{min} is the minimum distance from the relaxed position, and d_{max} is the maximum distance from the relaxed position.

4 principles

The crack length increases with the number of deformation cycles of the pure shear specimens with pre-notch under cyclic loading.