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Rubber - Determination of frictional properties

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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 of Standardization Documents"

Drafting.

The translation method used in this document is equivalent to ISO 15113.2005 "Determination of Rubber Friction Properties".

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

---GB/T 2941-2006 Rubber physical test methods General procedures for sample

preparation and adjustment (ISO 23529.2004, IDT).

Introduction

When measuring friction, various geometric combinations can be used, but each combination may give a different friction coefficient value μ. In a specific situation

Below, each combination may be applicable, but when comparing materials, it is necessary to use some standard methods for specifying test conditions.

Line test.

Sheet rubber specimens are the easiest to obtain, and the measurement between two flat surfaces is closer to the actual state of use. Therefore, this is the most

Widely used geometric shapes. For this geometry, the test device used needs to be carefully designed to ensure that the contact between the two surfaces can be

Repeat, this is discussed in Appendix A.

When the conditions for rubber molding are available, some people prefer to use hemispherical rubber sliders and flat test tracks. If the friction surface is not covered

The line of action including the force sensor and the drag force will give a clearer contact area and minimize the related errors. However, using

In this geometry, the frictional force is not proportional to the normal load (see Appendix B), and the contact area is estimated by the rubber modulus, so

Attention should be paid when quoting the coefficient of friction value. The disadvantage of this method is that the sample needs a special mold to prepare, and the rubber product cannot be used directly. and

Moreover, since wear and friction are inseparable to a certain extent, continuous testing will produce a "plane" on the hemispherical test slider. because

It is recommended to check the test surface frequently to ensure that the geometry of the initial contact is maintained.

Another "sphere-surface" geometric combination is to slide a hard ball on a flat rubber surface. These two "sphere-surface" combinations cannot be completed.

Fully equivalent. The furrowing effect occurs when the hard ball passes through the rubber surface, which will produce energy hysteresis loss, resulting in a high friction coefficient. NS

However, in some cases, this may be a more applicable method.

Although there may be some uncertainty in the contact area of the "plane-plane" geometric combination, this document still uses this geometric shape

The reason is that it has a wide range of practicality. However, it needs to be emphasized that there must be a reasonably designed device so that the direction of action of the sensor is

In the contact plane of the specimen (see Appendix A). This method can be applied to other contact geometry combinations to suit specific finished products, including those in Appendix B

Listed "sphere-surface" geometric combinations.

This document is based on linear motion, and guidelines for the test layout are given in Appendix A. Due to the heat generated by friction, the

The test speed is limited to 1000mm/min or less to avoid a large temperature rise on the interface. If the conditions of use involve high speed, as shown in the appendix

As mentioned in A, a completely different method based on rotational motion is more applicable. The test methods listed here can be used at a series of fixed speeds

Measure dynamic friction. When the minimum speed drops to almost invisible motion, friction behavior (static friction) of approximately zero speed will be given. This may not

It is the same as those discussed in Appendix C that involve adhesion (adhesion) factors. This method is only suitable for measuring the initial friction force, provided

The equipment has a uniformly loaded device and a sufficiently sensitive load sensor. The discussion and correctness of static friction are given in Appendix C

Method of measurement.

Rubber friction is complex, and the coefficient of friction depends on the contact geometry, normal load, speed, temperature and rubber composition. These parameters

The number and other factors affecting the measurement are discussed in Appendix D.

Determination of rubber friction properties

1 Scope

This document provides the measurement principle of the friction coefficient, describes the rubber and the standard test plane, the rubber material itself or the rubber and other specified

Method for measuring the coefficient of friction between surfaces.

2 Normative references

The contents of the following documents constitute the indispensable clauses of this document through normative references in the text. Among them, dated quotations

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

This document.

GB/T 17200-2008 Technical Specification for Rubber and Plastic Tensile, Compression and Flexural Testing Machine (Constant Speed Drive) (ISO 5893.2002,

IDT)

ISO 23529 Rubber-General proceduresforpre-

paringandconditioningtestpiecesforphysicaltestmethods)

3 Terms and definitions

The following terms and definitions apply to this document.

3.1

Coefficient of friction coefficientoffriction

Under the specified test conditions, the ratio of the frictional force that hinders movement between two flat surfaces to its normal force.

Note. The friction coefficient is dimensionless, and its value is not limited to numbers less than 1.

3.2

Areaofcontact

The entire apparent area between two test surfaces (test track and specimen).

Note. The actual contact area (see 3.3) may be smaller than this area.

3.3

Realareaofcontact

The sum of all the tiny contact areas of the two test surfaces.

3.4

Velocityoftest

The driving speed of one surface relative to the other.

Note. If stick-slip occurs (see 3.5), the speed will be the average speed of one surface relative to another surface.

3.5

Stick-slip