

ICS 83.060



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

GB/T 11211-2009

Replacing GB/T 11211-1989

**Rubber, vulcanized or thermoplastic -- Determination of
adhesion to metal -- Two-plate method**

硫化橡胶或热塑性橡胶 与金属粘合强度的测定 二板法

(English Translation)

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Foreword

This standard is equivalent to ISO 814:2007 "Vulcanized rubber or thermoplastic rubber --- Determination of the bond strength with metal --- two-board method" (English version).

This standard replaces GB/T 11211-1989 "Determination of the adhesion strength of vulcanized rubber and metal."

This standard is equivalent to translation ISO 814:2007.

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

- a) the words "this International Standard" are replaced by the words "this standard";
- b) Replace the comma "," as a decimal point with a decimal point ".";
- c) Remove the preface to international standards.

The main changes in this standard compared with GB/T 11211-1989 are as follows.

---Modified the name of the standard;

--- The object of measurement is expanded from vulcanized rubber to vulcanized rubber and thermoplastic rubber;

--- Increase the typical positioning device fixture diagram (4.2 of this edition);

--- Sample shape and size change (5.1 of the 1989 edition; 5.1 of this edition);

--- The number of samples changed from "not less than 5" to "at least 3" (5.1.4 of the 1989 edition; 5.3 of this edition);

---The test speed was changed from the original "50±5mm/min" to "25mm/min±5mm/min"

(Chapter 7 of the 1989 edition; 6.2 of this edition);

--- The test result is changed from "arithmetic mean, highest value, lowest value", "destruction type and quantity" to "test result of each sample", "Type and percentage of damage" (Chapter 9 of the 1989 edition; Chapter 8 of this edition).

1 Scope

This standard specifies the test method for determining the bond strength between rubber and metal bonded between two parallel metal sheets.

The method is applicable to samples prepared under the conditions of standard laboratories, and the test results can also be the development and manufacturing methods of rubber compounds. The study provides experimental data.

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 Is it 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)

ISO 5893 Rubber and plastic testing equipment - tensile, bending and compression type (constant speed drive) - description

3 Principle

This method measures the force required to cause a bond failure in a standard size specimen. The sample is adhered to the rubber layer by two parallel metal sheets in combination; the direction of the force is 90° to the bonding surface.

4.1 Tensile testing machine

The tensile testing machine shall comply with the requirements of ISO 5893, and the force measurement accuracy shall reach the level 2 specified in ISO 5893. The speed of fixture movement is 25 mm/min $\pm$ 5 mm/min.

Note: The inertia (pendulum) type dynamometer is prone to different results due to friction and inertia effects. The results of a no-inertia (for example, electronic or optical sensor) type dynamometer are not affected by these factors and are therefore preferred.

4.2 Positioning device

It is used to fix the specimen in the testing machine (4.1) and to ensure that the force applied during the test is accurately centered.

The recommended positioning device is shown in Figure 1 - Test fixture for fixing rubber and metal bonded specimens.

5.1 Size

The standard specimen has a thickness of $3\text{mm} \pm 0.1\text{mm}$ and a rubber cylinder with a diameter of 35mm to 40mm. The measurement accuracy is 0.1mm. Its rounded end face is bonded to two metal plates of comparable diameter. Dimensional measurement is performed in accordance with GB/T 2941. The diameter of the metal plate is about 0.1mm smaller than the diameter of the rubber cylinder. The thickness of the metal plate is not less than 9 mm. The recommended sample format is shown in Figure 2 - standard sample.

5.2 Sample preparation

5.2.1

Standard size circular metal sheets are preferably made of rolled carbon steel rods. It is also possible to use other parts whose dimensions are the same as the basic dimensions. metal. The preparation and processing of smooth metal sheets should be carried out in accordance with the bonding system requirements studied.

5.2.2

Cut the unvulcanized rubber disc with a circular punching knife, the size should be such that the amount of glue is limited when molding. According to the bonding system under study The rubber surface bonded to the metal is treated.

5.2.3

Rubber discs and metal sheets are assembled and vulcanized in a mold. The structure of the mold should be such that the rubber protrudes from the edge of the metal plate by about 0.05 mm to Prevent tearing of the rubber by the metal edge during the test.

5.2.4

Care should be taken when preparing the sample so that the bonding surface of the rubber and metal does not contaminate dust, moisture and foreign matter. Not when assembling samples Apply hand contact adhesive surface.

5.2.5

It shall be heated at a controlled temperature and pressure for a specified period of time for compression molding. The time and temperature of vulcanization should be studied The requirements of the adhesive system are consistent.

5.2.6

After the end of vulcanization, the sample should be taken out of the mold very carefully to avoid the adhesive surface of the sample being improperly cooled before cooling. stress.

5.3 Number of samples

At least 3 samples should be tested.

5.4 Sample adjustment

5.4.1

Before the test, the sample shall be adjusted for at least 16h in accordance with the requirements of GB/T 2941 at the standard laboratory temperature ($23\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$ or $27\text{ }^{\circ}\text{C} \pm 2\text{ }^{\circ}\text{C}$). For comparison purposes, one or a series of tests should always be performed at the same temperature.

5.4.2

The time interval between test and vulcanization shall comply with the requirements of GB/T 2941.

6 Test steps

6.1

Mount the specimen on the positioning device of the testing machine, and pay great attention to adjust the specimen to center it so that the force is evenly distributed on the entire cross section.

6.2

Apply tension to the clamp so that the clamp moves at a constant speed of $25\text{mm/min} \pm 5\text{mm/min}$ until the specimen is destroyed. Maximum force value.

7.1 Bond strength

The bond strength is calculated by dividing the maximum force value by the cross-sectional area of the sample, in MPa.

7.2 Symbol of bond failure

- a) R indicates rubber damage;
- b) RC indicates rubber and coating damage;
- c) CP indicates coating and undercoat damage;
- d) M indicates metal and primer damage.