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

GB/T 15254-2014

**Rubber, vulcanized - Determination of adhesion to metal - 180°
peel test method**

硫化橡胶 与金属粘接 180°剥离试验

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Foreword

This standard is drafted in accordance with the rules given in GB/T 1.1-2009. This standard replaces GB/T 15254-1994 "Rubber, vulcanized - Determination of adhesion to metal - 180° peel test method". As compared with GB/T 15254-1994, the main technical changes are as follows: - ADD the warning; - ADD a schematic diagram of the 180° peel test of bonding between vulcanized rubber and metal (see Figure 1); - ADD that "the recommended vulcanized rubber thickness is (2.0 ± 0.2) mm" (see 5.2); - ADD the requirement for the length of the anti-adhesion tape of "about 10 mm" (see 6.5); - ADD that "it may increase the thickness of the backing material or increase the thickness of the rubber test piece to carry out test; if the vulcanized rubber breaks, record the data" (see 9.5); - ADD the "peel force curve" (see Figure 3); - DELETE the average thickness of the adhesive layer in the measured specimen from the original version (see

6.8 of 1994 version). This standard is compiled using the redrafting method and making reference to ISO 8510-2:2006 "Adhesives - Peel test for a flexible-bonded-to-rigid test specimen assembly - Part 2.180° peel". The consistency with ISO 8510-2:2006 is nonequivalent. This standard was proposed by the China Petroleum and Chemical Industry Federation. This standard shall be under the jurisdiction of the General Test Method Subcommittee for Rubber and Rubber Products Standardization Technical Committee (SAC/TC 35/SC 2). This standard is mainly drafted by: National Rubber and Latex Products Quality Supervision and Inspection Center, Gubo Chengshan (Shandong) Tire Co., Ltd.,

Beijing Rubber Industry Research and Design Institute. The main drafters of this standard. Zheng Xiangqian, Li Baowei, Shen Xinyuan, Ju Xunning, Xie Junfang, Li Jing. This standard replaces the standard previously issued as follows: - GB/T 15254-1994. Rubber, vulcanized - Determination of adhesion to metal - 180° peel test method Warning. Personnel using this national standard shall have hands-on experience in formal laboratory work. This standard does not address all possible safety issues, so users are responsible for adopting appropriate safety and health measures and ensuring compliance with national laws and regulations.

1 Scope

GB/T 15254-2014 measures how strongly vulcanised rubber is bonded to metal. The bond is the critical element in a large family of components - engine and suspension mounts, bearings, bushings, rollers, lined pipes and tanks, conveyor belting - where the rubber does the work and the metal carries the load, and where failure is almost always at the interface rather than in either material. That bond is formed during vulcanisation, so its quality depends on surface preparation, adhesive and cure conditions, none of which can be verified by looking at the finished part. Peeling is the way to interrogate it: the load concentrates at the advancing line of separation, which is the condition the bond is weakest under and the one that discriminates between a good bond and a marginal one. This standard specifies the 180° peel test method for vulcanised rubber bonded to metal and applies to the determination of 180° peel strength for such assemblies. Under CCS G40, it is the reference for rubber-to-metal bonding manufacturers, for the automotive and industrial customers who specify a minimum peel strength, and for the laboratories that qualify adhesive systems and monitor production.

This standard specifies the 180° peel test method for vulcanized rubber as bonded to metal. This standard is applicable to the determination of the 180° peel strength of vulcanized rubber as bonded to metal. The 180° peel strength of other flexible materials as bonded to rigid materials may also refer to this standard. This standard does not apply to low-flexibility materials which will produce cracks or delamination after bending 180°. Such materials may be subjected to a 90° peel test, the test method may refer to GB/T 7760.

2 Normative references

The following documents are essential to the application of this document. For the dated documents, only the versions with the dates indicated are applicable to this document; for the undated documents, only the latest version (including all the amendments) are applicable to this standard.

GB/T 2941-2006 Rubber - General procedures for preparing and conditioning test pieces for physical test methods (ISO 23529.2004, IDT)

3 Principle

The specimen is made of vulcanized rubber bonded to metal. The open end of the bonded specimen is gradually peeled off in parallel along the longitudinal direction of the bonded material at a stable speed. The applied force passes through the peeled portion of the rubber-bonded material and is parallel to the metal plate.

4 Device

4.1 Testing machine The force measurement range of the test machine shall be appropriate. The destructive force of the specimen shall be within the range of 10% ~ 80% of the full scale.

4.2 Specimen holder There shall be two specimen holders. One holder is suitable for holding the metal plate, whilst the other holder is suitable for holding the vulcanized rubber. The holder holding the vulcanized rubber shall be automatically adjusted, so that the applied force is parallel to the metal plate, as shown in Figure 1.

4.3 Measuring tools The accuracy of the measuring tools which measure the bonding width of the specimen shall be not less than

0.1 mm.

5 Specimen

5.1 The specimen is made of vulcanized rubber as bonded to a metal plate. Unless otherwise specified, the shape and dimensions of the specimen are as shown in Figure 2.

5.2 The recommended vulcanized rubber has a thickness of (2.0 ± 0.2) mm, a width of (25.0 ± 0.5) mm, a length of at least 350 mm. If agreed between the supplier and the purchaser, it may use the vulcanized rubber of other thicknesses, which should not exceed

5.3 The metal plate shall be flat, with a thickness of

1.5 mm, a width of (25.0 ± 0.5) mm, a length of at least 200 mm.

6 Preparation of specimen

6.1 Types and designations of vulcanized rubber, metal, adhesive, surface treatment of bonding surface, ratio of adhesive, number of application of coating, time of drying, curing conditions such as temperature, pressure, time, etc.

6.2 Rubber and metal plates may be vulcanized and bonded, or vulcanized rubber and metal plates may be bonded by adhesive.

6.3 Specimens may be prepared individually or otherwise bonded to a large plate and then

cut into individual specimens. Care shall be taken to cut the specimen, to protect it from thermal or mechanical damage. When cutting, discard 12 mm from each side parallel to the length of the specimen.

6.5 When preparing the specimen, put an anti-adhesive tape of about 10 mm long and about 30 mm wide between the rubber and the metal plate at the peeling end of the specimen, to facilitate peeling off the specimen before the test.

6.6 The specimen shall be flat and the misalignment of the bonding surface shall not exceed

0.2 mm.

7 Number of specimens

The number of specimens shall not be less than 5.

8 Specimen conditioning and test environment

The specimen conditioning, test temperature, time interval shall comply with the provisions of GB/T 2941-2006.

9 Test procedure

9.1 Measure the width of the bonding surface of the specimen. Measure the part for not less than 3 times. Take the average value, accurate to

0.1 mm.

9.2 Bend the vulcanized rubber at the peel end for 180°.

9.3 Turn on the test machine and let the holder to peel off the specimen at a speed of (100 ± 10) mm/min. Other speeds may be used if otherwise specified.

9.4 Use an automatic recording device to continuously record the peeling force at the time of peeling off. The peeling length shall be at least 125 mm.

9.5 If part of the tearing occurs during the test, the test may be continued after the splitting of the vulcanized rubber and the metal plate by a knife.

9.6 Record the specimen peeling failure type The sample peeling failure type is indicated by the following symbols.

10 Test results

10.1 After discarding the initial 25 mm peel length on the peeling curve, take the average of the forces on the remaining peeling curves, as the average peel force of the specimen, as shown in Figure