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Replacing GB/T 519-2008

Test methods for measuring physical properties of pneumatic tyres

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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 519-2008 “Test methods for measuring physical properties of pneumatic tyres”. Compared with GB/T 519-2008, the main technical changes are as follows:

- MODIFY the normative references (see Clause 2 of this Standard, Clause 2 of 2008 edition);
- MODIFY the terms and definitions, DELETE GB/T 6039 (see Clause 3 of this Standard, Clause 3 of 2008 edition);
- ADD the selection of sample preparation tools (see 4.1);
- DELETE the sliding abrasion test (see 2008 version 5.1.3.2);
- ADD the DIN abrasion test (see 5.1.3.2);
- MODIFY the length of the sample, from about 150 mm ~ 250mm to not less than 150 mm (see 5.2.1.1.1 of this Standard, 5.2.1.1 of 2008 edition);
- ADD the adhesive strength between cord plies after aging (see 5.2.2.6);
- MODIFY “it shall cut a length of tyre of about 60 mm” TO “it shall cut a length of tyre of more than 200 mm” [see 5.3.3.1.2 d) of this Standard, 5.3.3.1.3 b) of 2008 edition];
- MODIFY the dimension of the hardness sample (see 7.6 and 8.2 of this Standard, 7.6 and 8.2 of 2008 edition).

This Standard is proposed by China Petroleum and Chemical Industry Association.

This Standard is under the jurisdiction of National Technical Committee on Tyre Rims of Standardization Administration of China (SAC/TC 19).

Drafting organizations of this Standard: Triangle Tire Co. Ltd., Shandong Linglong Tire Co., Ltd., Sailun Jinyu Group Co., Ltd., Wanli Tire Co., Ltd., Beijing Research and Design Institute of Rubber Industry, Aeolus Tyre Co., Ltd., Guizhou Tyre Co., Ltd., Zhejiang Ketai Tire Co., Ltd.

Main drafters of this Standard: Ni Shujie, Li Donglin, Chen Shaomei, Hou Xiaoqian, Wang Zhiyuan, Wang Kexian, Xu Lihong, Ren Shaowen, Feng Ping, Xia Huasong, Mou Shouyong, Li Shuhuan.

The previous versions of the standard replaced by this Standard are as follows:

- GB/T 519-1986, GB/T 519-1993, GB/T 519-2003, GB/T 519-2008.

Test methods for measuring physical properties of pneumatic tyres

1 Scope

This Standard specifies the terms and definitions, sample preparation, test for physical properties of covers, penetration analysis determination method for inside liners of tyres, test for physical properties of inner tubes and test for physical properties of flaps for test methods for measuring physical properties of pneumatic tyres (covers, inner tubes and flaps)

This Standard applies to passenger car tyres, truck tyres, agricultural tyres, earth-mover tyres and industrial pneumatic tyres.

This Standard does not apply to aircraft tyres, motorcycle tyres and cycle tyres.

2 Normative references

The following referenced documents are indispensable for the application of this document. For dated references, only the dated edition cited applies. For undated references, the latest edition of the referenced document (including all amendments) applies.

GB/T 528 Rubber, vulcanized or thermoplastic - Determination of tensile stress-strain properties

GB/T 529 Rubber, vulcanized or thermoplastic - Determination of tear strength (Trouser, angle and crescent test pieces)

GB/T 531.1 Rubber, vulcanized or thermoplastic - Determination of indentation hardness - Part 1: Durometer method (Shore hardness)

GB/T 531.2 Rubber, vulcanized or thermoplastic - Determination of indentation hardness - Part 2: IRHD pocket meter method

GB/T 532 Rubber, vulcanized or thermoplastic - Determination of adhesion to textile fabric

GB/T 1682 Rubber, vulcanized - Determination of low-temperature brittleness - Single test piece method

GB/T 1689 Rubber vulcanized - Determination of abrasion resistance (Akron machine)

GB/T 2941 Rubber - General procedures for preparing and conditioning test pieces for physical test methods

GB/T 3512 Rubber, vulcanized or thermoplastic - Accelerated ageing and heat resistance tests

GB/T 6326 Tyre terms and definitions

GB/T 9867 Rubber, vulcanized or thermoplastic - Determination of abrasion resistance using a rotating cylindrical drum device

GB/T 11181 Steel cord for radial tyre

3 Terms and definitions

For the purpose of this document, the terms and definitions defined in GB/T 6326 apply.

4 Sample preparation

4.1 Sample preparation tools are selected according to GB/T 2941, it may also use other sample preparation tools that meet the requirements for test sample preparation.

4.2 The finished product after vulcanization shall be conditioned indoors before sampling. The conditioning time of covers is not less than 24 h; the conditioning time of inner tubes and flaps is not less than 12 h.

4.3 If the sample taken from the finished product is not smooth in surface or is thicker than the corresponding standard provisions, it shall be cut and grinded according to GB/T 2941. When the thickness of the sample is less than the corresponding standard provisions, the sample can be cut according to the actual thickness of the sample.

5 Test for physical properties of covers

5.1 Test for physical properties of rubber materials

5.1.1 Tensile properties

5.1.1.1 Sampling methods for each part:

- Tread part: TAKE the center line of crown as the datum, and CUT the sample circumferentially along the tyre. The rubber thickness of crown part is not more

ply is a set.

5.2.2.1.2 CUT a peeling hole of 20 mm ~ 50 mm between the peeling ply at one end of the sample described in 5.2.1.1. To prevent mistaking cords and plies, cut a side hole of uniform depth on both sides of the sample's peeling ply. For diagonal tyres, the depth of the sample's cutting hole is 2.5 mm, and for radial tyres, the depth of the sample's cutting hole is 3.5 mm, so as to ensure that the effective peeling width of the sample is 25 mm ± 0.5 mm. Do not cut off the cord when cutting the rubber strips on both sides of the sample.

5.2.2.1.3 DETERMINE the adhesive strength of the above samples according to GB/T 532. The peeling order is from the inner ply to the outer ply, and the inter-ply adhesive shall be attached to the bottom of the peeling ply. There shall be no mistaking cords or connectors, otherwise the peel value is not included in the results.

5.2.2.2 Adhesive strength between tread rubber and breaker of diagonal tyres, between tread rubber and belt of radial tyres or between tread rubber and cap ply of radial tyres

The sample is the same as 5.2.1.1. When clamping the sample, the rubber ply shall be clamped on the holder. The steps are the same as 5.2.2.1.

5.2.2.3 Adhesive strength between sidewall rubber and cord ply

See 5.2.1.2 for the sample. CUT a peeling hole of 20 mm ~ 40 mm between the rubber and the carcass cord ply or between the rubber and the carcass steel cord ply from the shoulder of the sample. The test procedure is the same as 5.2.2.1.

5.2.2.4 Adhesive strength between carcass cord ply and beaker cord ply, and between beaker cord ply and beaker cord ply of diagonal tyres

See 5.2.1.1 for the sample. TAKE 2 or 3 plies of cords as a set. The test procedure is the same as 5.2.2.1.

5.2.2.5 Adhesive strength between carcass cord ply and belt, between belt and belt, between belt and cap ply, and between cap ply and cap ply of radial tyres

See 5.2.1.1 for the sample. TAKE 2 piles as a set. The carcass cord ply shall be clamped on the holder during the test, the rest of the test procedure is the same as 5.2.2.1.

5.2.2.6 Adhesive strength between cord plies after aging

The sample is subjected to aging according to GB/T 3512. TAKE out the sample after aging. PLACE the sample according to the provisions of GB/T 2941. MEASURE the adhesive strength between cord piles after aging. The test procedure is in accordance

5.3.3 Tensile properties of cords

5.3.3.1 Sampling

5.3.3.1.1 Diagonal tyres

The sampling consists of two cases, i.e. odd and even plies:

a) When sampling from the odd cord plies, take 2 cords with a distance of ate least 40 mm from the first ply of the crown cord ply to obtain two trace lines. CUT the sample along the trace lines, indicating the ply.

b) When sampling from the even cord plies, CUT the sample with a width of at least 50 mm along the cord direction of the corresponding ply, indicating the ply.

5.3.3.1.2 Radial tyres

The sampling consists of the following four cases:

a) Sampling of tyre's carcass fiber cords: SEPARATE the cord ends and plies with a knife at the seam allowance part of tyre's inner tube; TAKE cords in each ply in turn, indicating the ply.

b) Sampling of tyre's cap ply cords: CUT through the tread rubber to the belt steel cord ply part circumferentially along the center of the tyre crown in a certain width; PEEL off cap ply fiber cords with a length of more than 350 mm at the interface of belt and cap ply; TAKE cap ply cords of each ply in turn, indicating the ply.

c) Sampling of tyre's carcass steel cords: along the arrangement direction of carcass steel cords, SEPARATE the carcass steel cord from the backpack end point of the carcass steel cord at the tyre bead part and REMOVE the attached rubber, without damaging steel cords.

d) Sampling of tyre's belt (including zero-degree belt) steel cords: it shall cut a length of tyre of more than 200 mm; REMOVE the tread rubber to expose belt steel cords; SEPARATE the steel cord of each belt in turn from the end point of steel cords of two belts of tyres and REMOVE the attached rubber.

5.3.3.2 Sample requirements

The length of the cord sample taken shall be 350 mm or more, and the length of the cord sample of the small-specification (with a section width of 185 mm and below) tyres shall be at least 180 mm. The number of cords represent each ply shall not be less than 10.

5.3.3.3 Test procedure

average of the thickness of the two points near the joint as the sample thickness.

7.3.3 TEST according to the test method specified in GB/T 528, and the test report value shall be the minimum value of four values.

7.4 Thermal tensile deformation

7.4.1 USE the type 1 dumbbell-shaped cutting knife specified in GB/T 528 to circumferentially cut a sample at the upper and lower mold positions of the inner tube respectively along the inner tube, and MAKE marks with mark spacing of 25 mm ± 0.1 mm.

7.4.2 STRETCH the sample and FIX when the mark spacing is 37.5 mm and then PLACE it in a hot air aging chamber at a temperature of 105 °C ± 2 °C for 5 h. After taken out, CONDITION it in the standard laboratory environment specified in GB/T 2941 for 2 h, to remove the tension. After another 8 h, MEASURE the mark spacing. CALCULATE the thermal tensile deformation according to equation (3), and TAKE the maximum value of the test results of two samples.

$$S_r = \frac{L_t - L_0}{L_0} \times 100\% \qquad \cdots\cdots (3)$$

where:

S_r - the thermal tensile deformation, %;

L_0 - the initial test mark spacing, in millimeters (mm);

L_t - the test mark spacing after the test, in millimeters (mm).

7.5 Tearing properties

7.5.1 Radially CUT 5 samples of tearing properties at the upper and lower mold positions of the inner tube respectively along the inner tube. The radial direction of the inner tube is the length direction of the sample.

7.5.2 CUT or GRIND the cut sample to the sample of standard thickness (those with tyre body thickness less than or equal to 2.2 mm can be directly cut into the sample) according to the provisions of GB/T 2941. After conditioned in the standard laboratory environment for 16 h, cut it into the sample and test according to GB/T 529.

7.6 Hardness

CUT the sample with a length of not less than 50 mm and a width of not less than 30 mm from the inner tube, and STACK the sample into a sample with a thickness of 6 mm or more. TEST according to GB/T 531.1 or GB/T 531.2.

required to be peeled off at a 90 ° angle in the peel-off test and peeled off until the rubber and the metal valve are separated.

7.8.1.2.4 During the test, if the valve covering is pulled apart, the adhesive force is calculated by the load at the time when the covering is pulled apart. The adhesive force value is expressed as the minimum value of the test values of two samples, in Newton (N).

7.8.2 Adhesive strength between valve gasket and tyre body rubber

CUT the sample of valve gasket from the inner tube, and PREPARE one sample with a width of 10 mm ± 0.5 mm respectively on any symmetrical and parallel parts on two sides of the valve. OPEN a hole of 20 mm ~ 30 mm on the joint of the gasket and the tyre body rubber; CLAMP the gasket and the tyre body rubber in the upper and lower holders respectively; TEST according to GB/T 532. The adhesive strength value is expressed as the minimum value of the test values of two samples, in kN per meter (kN/m). If the rubber ply is broken during peeling, the adhesive strength is greater than the tensile strength of the rubber ply, which shall be stated in the results.

8 Test for physical properties of flaps

8.1 Tensile properties

8.1.1 Circumferentially CUT the sample in the middle of the flap along the flap, and after cutting or grinding and adjusting the sample according to GB/T 2941, CUT it into 10 type 1 dumbbell-shaped samples according to GB/T 528.

8.1.2 CARRY out the tensile property test according to GB/T 528, and CARRY out the tensile property test after aging according to GB/T 3512.

8.2 Hardness

CUT the sample with a length of not less than 50 mm and a width of not less than 30 mm in the middle of the flap, and TEST according to GB/T 531.1 or GB/T 531.2.

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